

The *Stewardship Series*

Community GreenWays

Linking
Communities
to Country, and
People to Nature





When land is developed, whether for subdivisions, transportation, agriculture or forestry, there is an inevitable change to the balance found in natural systems. Drainage patterns are changed, trees are cut down, soil is moved and habitat is lost.

When these changes are small, natural systems can often absorb the impacts, and normal ecological functions can continue.

As the size and rate of development accelerates, the ability of natural systems to accommodate change diminishes and the evidence of damage becomes more widespread.

We must continue to look for new ways to minimize our impact on the underlying natural systems that support us, and take advantage of opportunities to repair past damage.

Community Greenways: Linking Communities to Country, and People to Nature provides forward looking tools that will help community leaders to understand the principles of the natural systems that support our lives.

“We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.”

***A Sand County Almanac
Aldo Leopold (1886-1948)***

Community Greenways

Linking Communities to Country, and People to Nature

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What are Greenways?

Networks of green space in sustainable communities

Community Greenways are linear green corridors that connect natural areas. Greenway Planning is a way of planning that creates linkages between human development and natural systems.

On the ground, greenways are corridors that link areas of greenspace to provide wildlife habitat and recreational opportunities. Greenways include trails in some areas and no public access in other areas. Greenways can include both public holdings and private working landscapes.

In practice, greenways are created as part of an integrated approach to land planning - balancing the needs of human communities and natural systems.

On the ground ...

Community Greenways are green space networks which are managed to help retain functioning ecological processes. Public green spaces, like parks and trails, can be connected with private working landscapes like the Agricultural Land Reserve and the Forest Land Reserve to create new green corridors. Together an integrated greenway system can be created.

Because many important ecological resources correspond to shoreline locations, additions to a greenway system are likely to focus on all types of water edge. Rare or critical upland ecosystems must also be included. These environmentally sensitive areas can be connected with recreation linkages including: parks, trails, ridgelines, rights of way, streets, lanes and unorganized green spaces to create a community greenway system.

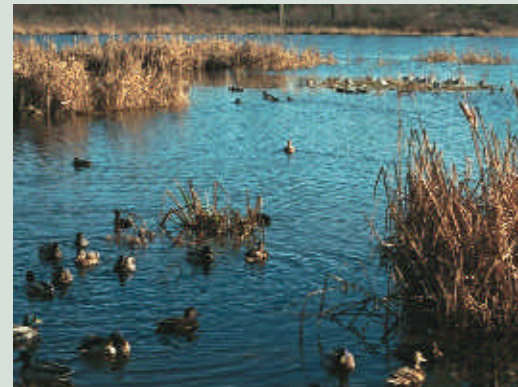
As an integrated planning approach ...

Community Greenways integrate ecosystem requirements into local land use planning.

For example, greenway planning recognizes the relationship of land development to the loss of stream riparian vegetation, of soil erosion from urban sites to water quality, stormwater management to water quantity and the effects of all these on fish habitat. Lost fish habitat results in loss of fish production, resulting in lost jobs in the fishery and in tourism. Lost jobs indicate a breakdown of sustainable economies and difficulties in supporting community growth and prosperity.

Community Greenways recognize that, in the long term, what we do to the ecosystem, we do to ourselves. Just as the British Columbia Forest Practices Code promotes sustainable forestry on provincial forest land for the sake of our long-term livelihood, greenway planning balances human needs and natural systems in urban areas to create sustainable communities.

Community Greenways are an integrated management tool which can help to focus limited human resources on limited natural resources.



Courtenay Riverway

The City of Courtenay has worked to establish a linear open space along the Courtenay River. This site includes a rehabilitation of a disused sewage lagoon to create wildlife habitat, public recreation, and trails.

What makes up a greenway ...

Many greenway segments already exist. Greenway systems are created by looking for every opportunity to re-establish links between these segments, to create green space networks.

Greenways will be different in size and form in response to their biophysical values and land use context. See page 46-59 for examples of greenway approaches in various land use contexts.

Greenways can include cooperative stewardship initiatives in:

- n Private green spaces
- n Public green spaces

Private Green Spaces

In BC communities, much of the existing green space is farms or forests - working landscapes - often under the protection of the Agricultural Land Reserve, Provincial Forest or Forest Land Reserve. These working landscapes play an important role in the function of natural systems. Including these lands in a greenway reinforces their continued productive land use - at the same time as recognizing their values as ecological and scenic resources to the community at large.

The riparian areas of waterways and wetlands are subject to the Fisheries Act. These corridors are prime candidates for greenways, whether in private or public ownership.

Private lands which may be included as part of a greenway system include:

- 4 agricultural land;
- 4 private forest land;
- 4 private golf courses or open space subdivision holdings;
- 4 private railway or utility corridors;
- 4 watercourse linkages and riparian corridors.

Respect for the concerns of private landholders must be a part of planning for Greenways. Changes to the way private lands are managed should be minimal, and will often be limited to co-operative responses to existing regulations. Public access should not be expected across private land, except where special agreements have been made with the landowner. Greenway planning strikes a balance between encouraging stewardship of the sensitive areas within private green spaces and supporting appropriate land use and enjoyment of private property by the landowner.

Public Green Spaces

Traditional parks, along with other public green spaces, will form a major component of greenways. Usually, all parts of a greenway which are open for public access will be owned or managed by public organizations. Public green spaces in a greenway could include:

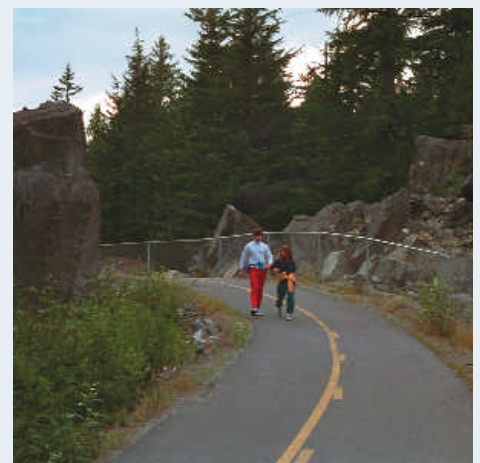
- 4 municipal parks;
- 4 provincial and national parks;
- 4 crown land and ecological reserves;
- 4 public facilities such as schoolgrounds, playing fields, and golf courses;

The management of these lands could be reviewed to consider options for providing a continuous recreational network, and to ensure that opportunities to maintain environmental integrity are not lost.

The ecosystem planning approach recognizes that economic, social and environmental concerns are interrelated - decisions in one area affect all others; like nature, it is all an integrated web.



Working Landscapes, such as farms, provincial forests, or private forest land provide important ecological linkages and contribute to greenways as part of a network of scenic green space.



The location of Greenway Trails will vary. A route separate from environmentally sensitive areas, complete with fencing, may be required in some places to ensure conservation objectives for sensitive habitats are met.

Community Greenways

Greenway Examples

Successful greenways are being enjoyed throughout Canada and in the U.S.

Greenways can be developed in many different forms, including:

- 4 greenways established by direct acquisition of public open space such as in Boulder, Colorado,
- 4 greenways which provide recreational trails using old rail corridors such as the Galloping Goose Trail in Victoria,
- 4 or greenways which provide opportunities for walking and cycling such as the River Walk in Quesnel.

These projects are illustrated as examples only, and in fact greenway programs may take many different forms depending on the circumstances.

Boulder, Colorado

'Boulder' s success is its quality of life'

Denis Nock, President of the Boulder Chamber of Commerce attributes Boulder's success to its quality of life - its trees, open space, and livability. He states that businesses move to Boulder rather than locate elsewhere in the region, and pay higher taxes and land costs, to take advantage of the amenities in Boulder.'



Photo Credit: Gary Lacy

A Powerful Community Building Tool

Boulder's success in greenway planning has been a result of strong and committed community leadership, and the recognition of the inherent value of natural open space.

Community Action

Boulder's open space program has resulted from a community commitment both in terms of money and time. A recent brochure acknowledges the help of over 300 volunteers devoting thousands of hours for trail maintenance, plant and wildlife inventories, and interpretive projects.

The Value of Open Space

As a part of Boulder's Open Space program efforts have been made to quantify the value of open space. As the president of Boulder's Chamber of Commerce notes, 'quality of life is an important aspect of a community's economic success.' The excerpts below quantify just two of these economic benefits.

'Researchers evaluating the impacts of a greenbelt on neighborhood property values in Boulder, Colorado, found that the aggregate property value for one neighborhood increased \$5.4 million with proximity to the greenbelt. Resulting in \$500,000 of additional annual property tax, the increase in property tax alone could recover the initial costs of the \$1.5 million purchase price in just three years.

In Boulder, Colorado, the value of homes adjacent to the greenbelt were 32% higher than those for similar residences 3,000 feet away. (Correll, Lillydahl, and Singell, 1978.)

A History of Greenway Planning

Boulder has a progressive history of open space management dating back to the beginning of this century when lands were purchased through a bond issue to protect the town's mountain skyline.

Throughout the years Boulder has maintained an aggressive open space acquisition program producing a legacy of 24,000 acres of publicly owned open space. This land continues to provide an environmental and recreational resource which has helped maintain Boulder's prosperity even as the region generally has faced difficult economic times.



Photo Credit: Gary Lacy

Capital Greenways

Victoria, British Columbia

Many people have worked to build a network of parks, trails, and linear corridors that create the framework for a green infrastructure in the provincial capital region.

In 1994 the Provincial Capital Commission set aside one million dollars to further encourage greenways initiatives in the region. The goals of the Greenways Program include development of a network of pathways, bikeways, highway corridors and waterways; preservation of significant heritage resources; ecosystems protection; preservation of visual corridors; and fostering of partnerships for stewardship.

One significant link in the capital greenways system is the Galloping Goose Trail which is built upon a 60 km former rail line which stretches from downtown Victoria to Leechtown outside Sooke and is considered the first “rails-to-trails” conversion in Canada.

Rail service along the route ended in 1979. The rails were removed and a trail was inaugurated for recreational use in 1989. The Capital Regional District (CRD) and its partner municipalities hold a recreational lease from the Ministry of Transportation and Highways on the urban portions of the rights-of-way.

The trail has been proposed to form a component of the Trans-Canada Trail, a proposed 15,000 km trail for hikers, skiers, equestrians and non-motorized vehicles starting from Victoria and ending at St. John’s, Nfld.

Funding from the Provincial Capital Commission Greenways Fund will be used to secure and promote a comprehensive network of green spaces “that are physically and visually linked.” The trail and bikeways



included in this greenway initiative will be considered an important element in the provincial government’s overall environmental strategy of reducing vehicle use and increasing health and recreation in the greater Victoria area.

Many more linkages and potential greenway corridors are now being identified and considered throughout the Capital Region in efforts to realize the the greenways vision - “veins of green spreading natural vitality throughout the region.”

Quesnel River Walk

Quesnel, British Columbia



The Quesnel River Walk provides a scenic recreational tour of the city, opportunities to enjoy and interpret history, and an alternative transportation route.

The Quesnel Riverfront Trail encompasses the city of Quesnel linking parks, quiet streets, places of historic interest, residential areas and the downtown section.

The recreational trail system was built in two phases. The first phase, the north trail, was built in 1990 and is 5 km in length. The north trail runs along the Quesnel and Fraser Rivers providing a peaceful and scenic trail for hundreds of citizens who walk, jog and bike along the riverfront. Along the greenway route, Ceal Tingly Park, commemorative trees, interpretive plaques and a restored steam shovel are some of the points of interest.

The second phase of the trail, the west side trail, is 4.3 km and meanders adjacent to the Fraser River and Baker Creek. Trail visitors are taken through residential areas, municipal parks and the north section of downtown Quesnel. Downtown is connected to the trail system by the historic Fraser River Footbridge. Other points of historical interest along the trail are marked with plaques telling the history of the city.



Community Greenways

Greenways: An Integrating Tool

A tool for integrating natural systems and communities

Greenway programs involve three sets of actions: Planning & Public Awareness, Public Investment, and Land Use Regulation. A well balanced Greenway program includes all three types of action.

Greenways can integrate decisions about environmental management among all levels of government as well as with conservation organizations and landowner groups. Greenways are about putting the pieces of the environmental management puzzle back together in British Columbia communities.

Planning and Public Awareness

Examples of integration through greenways include:

n within a city, a greenway project can allow cooperation among planning, parks and engineering departments to create a stormwater management facility with recreation, neighbourhood form, and aesthetic benefits.

n planning for a greenway can provide a way for a town, a regional district, regional offices of BC Environment, BC Transportation & Highways, Forests and federal DFO and DOE to come to a common strategy for environmental protection in a watershed or greenway area.

n public awareness programs like those on sedimentation and water quality can be coordinated through a greenway strategy, so that overlap or redundancy in delivery is eliminated, and resources are pooled to maximum benefit. A greenway strategy will also include a role for volunteer conservation organizations and landowners in the delivery of public awareness programs and greenway planning.

Public Investment

Examples of integration through greenways include:

n a village, regional district, and utility company can coordinate the alignment of a trail which crosses all of their jurisdictions. By this coordination they are able to create a trail which follows the most popular route, with the least overall cost.

n the BC Forest Service, BC Environment, forest license holders, a land trust and a regional district can develop a coordinated strategy for protection of a stream riparian corridor as a part of a greenway. The requirements of the Forest Practices Code are matched with parks and open space purchase actions by the regional district, and holding of conservation covenants by the land trust, so that all parties reinforce the goal.

n to provide fencing and revegetation along a disturbed riparian area in active farmland, a community can provide equipment and foreman services to support volunteer labour, with materials supplied by the landowner or contributed by interested sponsors.

Land Use Regulation

Examples of integration through greenways include:

n to effectively stop clearing of riparian zones, a local government and senior agencies can work together to develop a section of a tree protection bylaw which defines riparian zones and restricts tree removal. The two governments can sign a memorandum of understanding which defines in what cases the local government will issue tickets, and when DFO may lay charges under the Fisheries Act.

n CWS, BC Environment, Ducks Unlimited Canada, MAFF, local ranchers and a regional district can work together to devise a local bylaw to regulate land use on a floodplain, including policies on urban land development, water licensing, dyking, landfilling, amount of paved surface, vegetation disturbance, fencing of riparian and habitat areas, and livestock density.

n a local government, with the cooperation of the landowner, can pass a comprehensive development bylaw which allows for increased density in exchange for protection of a habitat area and installation of a greenway trail.

The Landowners Role

The Local Government Role

The Federal & Provincial Government Role

The Role of Conservation Organizations

Greenways integrate actions to maximize effectiveness.

Through rigorous action in the most sensitive parts of the greenway, and through integration of actions among stakeholders, limited resources can be applied to a greenway project with substantial results.

Planning and Public Awareness

Including greenway strategic planning, detail design, public and landowner contact.

Public Investment

Including volunteers working in the public interest.

Land Use Regulation

Including monitoring and enforcement.

Determine if there are environmentally significant areas on your property. If in doubt, ask for an opinion from a conservation organization or agency.

Consider how greenway values could benefit you and your community - in good will, tax benefits, advertising, value added or business opportunities.

Look for ways to pool resources with your neighbours for mutual benefit, e.g. in stormwater management or by providing a recreational amenity.

Consider cost sharing with governments and non-government organizations.

Form a community action group.

Be involved in community planning and in drafting of bylaws, to be sure that they are well designed and fair.

Encourage your peers to be stewards of the greenway.

If a problem could be solved by regulation, or a change to regulation or zoning, any landowner can trigger a review.

Lead greenway planning efforts.

Plan jointly with adjacent municipalities or regional governments where watersheds or greenways cross boundaries. Integrate greenway strategies into local growth management strategies, OCPs and neighbourhood plans.

Plan for greenway education and interpretation programs.

Provide integrated design and construction of trail networks, stormwater detention, habitat areas and recreation sites.

In critical areas, gain ownership of environmentally sensitive areas by dedication or purchase.

Consider use of Development Cost Charges to partially fund greenways.

Provide the local approving officer with a mandate to procure trail right of way during subdivision.

Include strategies for protection of greenway areas in Development Permits, Zoning Bylaws, Tree Protection and Soil Deposition Bylaws.

Press for better enabling legislation under the *Municipal Act*.

Provide interagency management teams, and information on location and extent of sensitive areas.

Provide scientific advice on greenway management.

Provide funding assistance for planning and public awareness programs.

Provide capital assistance programs for purchase and restoration of greenway lands, and for trails development.

Manage crown lands and institutions in the greenway consistent with the greenway strategy.

Cooperate with local governments to integrate environmental and land use regulations.

Provide sample regulations and guidelines. Sign memoranda of understanding with local governments to coordinate enforcement of regulations.

Consider law reform to support greenways.

Educate about the need for conservation of Greenway areas.

Assist in identifying ESAs, and in determining conservation priorities.

Assist in greenway planning.

Provide stewardship agreements and advice to private land owners.

Sponsor covenants or voluntary stewardship programs to protect greenway values of private lands.

Provide volunteer funding or labour for greenway restoration, trail or interpretive projects.

Operate land trusts to manage greenway lands.

Provide regular inspection and enforcement of covenant provisions.

Report bylaw violations.

Monitor development applications for consistency with greenway objectives.

Community Greenways

Greenways: Planning with Natural Systems

Working carefully, to build within the limits of natural systems

Watersheds are a basic unit of natural systems. Heights of land cause water falling as rain or snow to be collected by creeks and streams and deposited into lakes, rivers, and eventually into oceans at lower elevations.

This movement of water, and the heights of land which separate watersheds, have a fundamental impact upon all aspects of natural systems. For these reasons, watersheds are logical units for considering natural processes in community planning.

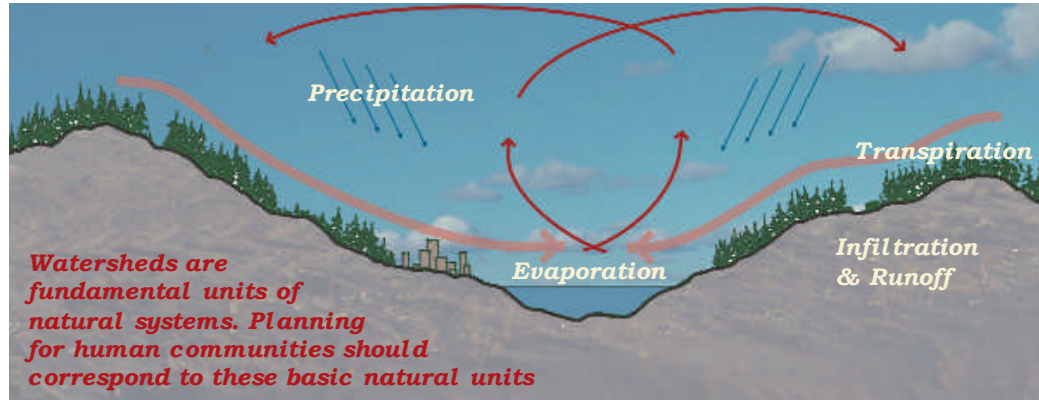
Greenways: Integrated Watershed Planning

Integrated Watershed Planning is a planning process where hydrology and biology are considered together to provide an understanding of natural systems that gives direction for planning and development decisions.

Community greenways are a first step toward the goal of integrated watershed planning. Greenways help to create physical links between natural open spaces which can make it easier for natural systems to respond to change. As well, greenways can help to build the network of linkages so that the needs of human and natural systems can be planned for at the same time. Planning for community greenways is about protecting natural systems so that we can protect ourselves.

Why Greenways & Integrated Watershed Planning?

As the rate of change accelerates, natural systems are both fragile and unpredictable. The media often reports on events which add to the evidence that the way we plan and implement development is putting stress on natural systems.



These are common symptoms of natural systems under stress:

- n** floods occur more often, at higher levels, and floodwaters run brown with silt.
- n** streams are buried or dyked, at high cost.
- n** fish populations disappear and the value of fisheries decline.
- n** remaining streams dry up in the summer.
- n** wells fail, or are polluted, resulting in major water infrastructure costs.
- n** beaches and lakes are closed to swimming, caused by unacceptable bacteria levels.
- n** tourism declines - or is reoriented towards major man-made attractions.
- n** people move out to more attractive surroundings or greener cities.
- n** commuter traffic increases - with road building costs and impacts on neighbourhoods.
- n** air pollution becomes a problem.
- n** most native vegetation is removed, or crowded by imported weedy species.
- n** native birds are rare - replaced by pigeons, starlings, crows.
- n** natural resource based jobs move away and the local economy changes - due to a loss of natural capital.
- n** major investment in environmental restoration is required.

Recognizing the Fragile and Variable Character of Natural Systems

Natural systems are resilient, with some ability to recover from damage. At the same time, even minor changes may begin a chain of events causing great turmoil, or loss of productive capacity.

In 1993, the Mississippi River overflowed its banks and submerged much of the great plains. This flood caused unprecedented damage throughout the American midwest.

Arising out of this natural event was a renewed awareness that the natural world holds surprises, and that engineered dykes are not the only defence against the extreme variability of nature.

Limits of Acceptable Change

Natural systems adapt constantly to changes. As development occurs within a watershed, many thresholds are met and exceeded. As each threshold of development is crossed, investment in mitigation should increase. However, at some point, the changes in natural systems cannot be mitigated, and become unacceptable. Greenway planning helps define what the limits of acceptable change may be for each watershed.



Practical Benefits of Community Greenways

Included in this section:

- 4 Healthy Ecosystems**
- 4 Vibrant Communities**
- 4 Physical Infrastructure**
- 4 Economic Values**

Greenways provide many practical benefits for communities and for the natural ecosystems which underlay them. The next section of this guide describes some of the ways that greenways contribute to the quality of community life.

Community GreenWays

Practical Benefits

Healthy Ecosystems

Greenway planning supports naturally productive ecosystems

Maintaining the productivity of natural systems is essential to ensure our continued prosperity. Greenway planning recognizes the delicate structure of natural systems - as well as the absolute importance of clean land, clean air, and clean water. Greenways, as part of a coordinated approach to environmental planning, can help to ensure that these resources are protected, and that the sustained viability of natural systems are considered in decisions about the form of human settlement.

Greenways, Part of Ecosystems

Greenways can be important components of an ecosystem providing connections between urban areas and the natural hinterland. To be effective in this role, greenways should:

- n** conserve streams, lakes, and wetlands along with their riparian areas.
- n** conserve key upland habitats and wildlife corridors.
- n** limit development on floodplains and groundwater recharge areas.
- n** provide places for stormwater detention and constructed wetlands.
- n** provide vegetation filters for sediment and pollutants.
- n** design trail systems with respect for habitat objectives, to encourage alternatives to the motor car, and for public appreciation of the greenway ecology.
- n** maintain green space within cities, to encourage compact communities and allow greater urban densities while maintaining the quality of natural systems.



Changes to natural systems, such as converting land for agricultural production, will have effects on plant and animal communities throughout an ecosystem.

Biodiversity Genetic Diversity

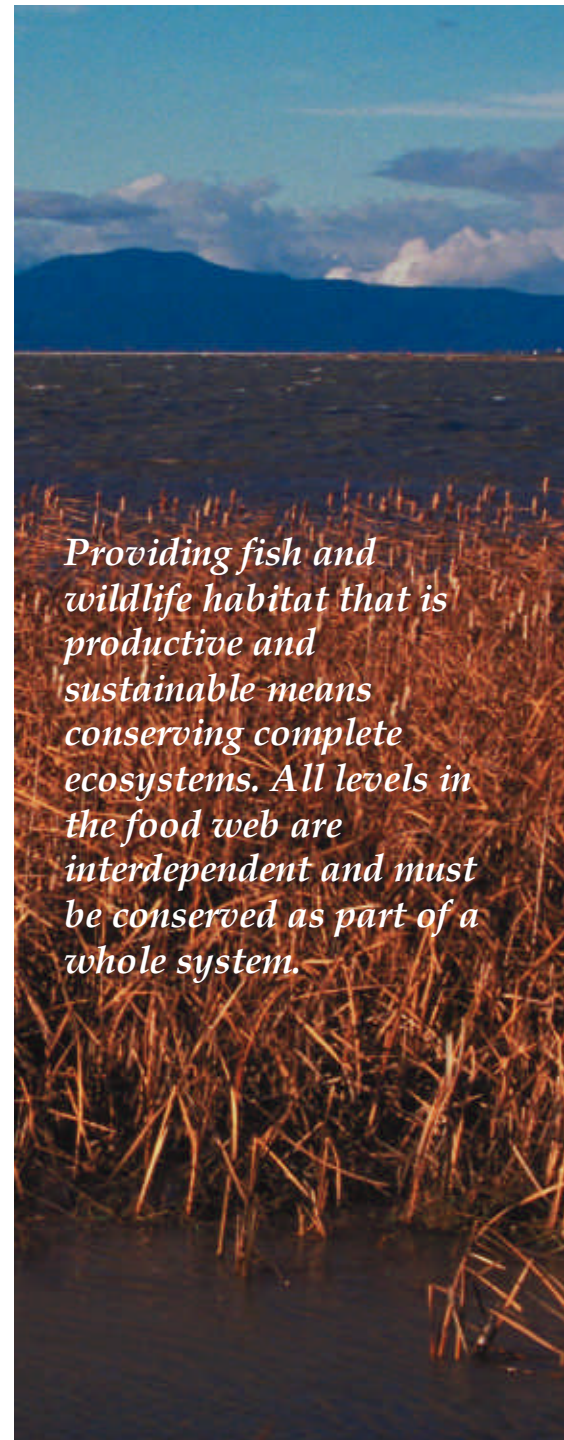
Greenways include wildlife corridors and connections between habitats. These connections are crucial to genetic diversity, which is created by the interbreeding among populations. Genetic diversity improves disease resistance, and provides species resilience.

Species & Habitat Diversity

The protection of habitat is fundamental to protecting fish and wildlife - and most importantly, rare, endangered, and threatened species. Greenways must include these important habitats if they are present.

By including a wide range of habitat type, greenways can encourage a diversity of species to coexist. This diversity of habitats and species:

- n** provides balance among all species and elements of an ecosystem.
- n** is critical to the food web.



Providing fish and wildlife habitat that is productive and sustainable means conserving complete ecosystems. All levels in the food web are interdependent and must be conserved as part of a whole system.



Photo Credit: Sid Channing

Diversity of plant and animal species is an important factor contributing to the stability of natural systems.

Stability within Dynamic Systems

Healthy ecosystems accommodate change through the infinitely complex interactions of many individual component parts. The result of all these interactions is a natural system which is outwardly stable but which is constantly changing to maintain its delicate internal balance.

The greenways concept recognizes the importance of such natural complexity and seeks to conserve critical elements of the natural infrastructure so that the dynamic functioning of ecosystems can continue. Greenways are a tool which can help to integrate human activity into a more sustainable relationship with natural systems.

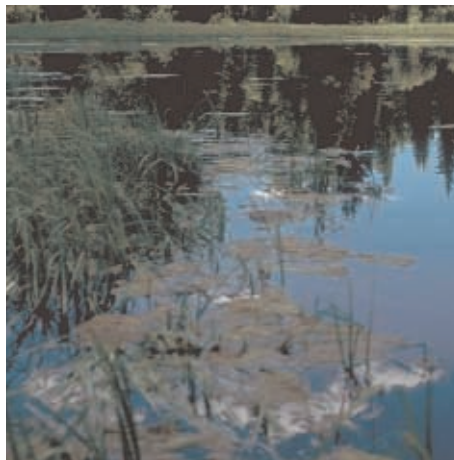
Greenways do not recreate 'natural ecosystems.' All that they can do is to add to the complexity and diversity of these systems and in doing so help to maintain a healthy ecosystem.

In this way community greenways can help in providing many of the benefits of natural systems, like:

- more stable water cycles - with moderate flood and drought.
- better water quality.
- healthier habitats, with more diverse flora and fauna.
- corridors to connect flora and fauna with one another, to allow for seasonal movements in response to change.
- a meaningful connection to nature for the people within a community.



Community greenways do not recreate natural systems. All that they can do is add to the diversity of these systems so that basic ecological functions are supported.



Healthy productive habitat, with diverse species of plants and animals can be a significant benefit of well implemented community greenways.

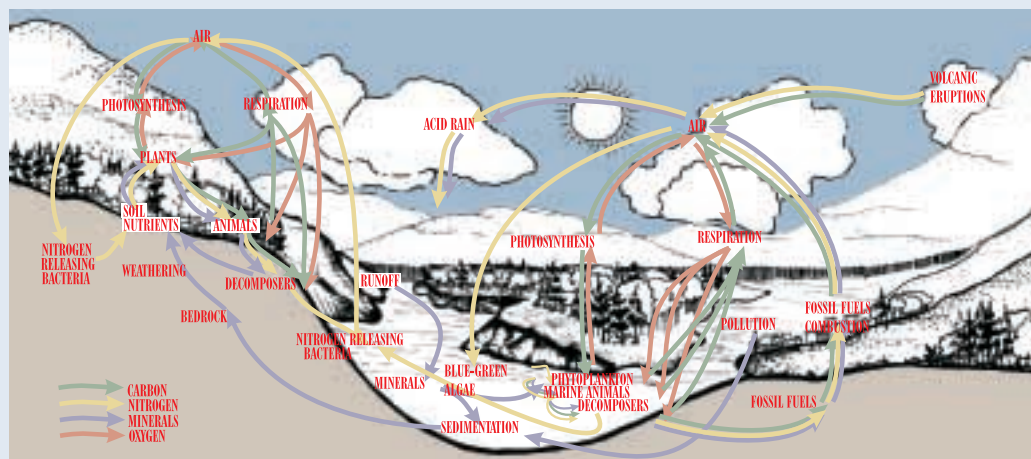


In addition to benefits for natural systems, greenways also provide direct and meaningful connections between nature and people within a community.

Natural Cycles

Developing productive and healthy greenway systems can contribute to the needs of healthy ecosystems.

The cycling of water, nutrients and minerals through an ecosystem are interconnected. Change in one part of the cycle will have impacts throughout the ecosystem.



Clean Air, Soil, and Water

Air Quality

Urbanization has contributed to the prospect of global warming, which is a threat with serious ramifications for some areas of British Columbia.

Rapid changes in temperature suggest that many ecosystems will not have time to adapt to new climactic conditions. If these rapid climate changes do occur, and natural ecosystems fail, how will human economies adapt?

Deteriorating air quality is a difficult problem to manage at a local level, because the sources of pollution may be nearby, or far away. In spite of these global concerns, greenways can offer an important local contribution to air quality by:

- n maintaining areas of natural vegetation near concentrated sources of exhaust, to help absorb carbon emissions.
- n providing windbreaks reducing the effects of wind.
- n providing shade and cooling to reduce the unpleasant heat buildup associated with dense urban areas.
- n providing corridors to allow movement of people, fish, and wildlife especially affected by changes to air quality.



Urbanization has contributed to the prospect of global warming. This trend may have serious implications for British Columbia.

Soil Quality

Soil is created over time as a product of many mechanical and biological processes. As the basis for the growth of plants the quality of soil is a major determinant of natural productivity. Land development can potentially damage soil in many ways including:

- n erosion caused by the removal of vegetation, allowing surface runoff to remove soil and carry it into streams.
- n contamination of productive soils through the addition of toxins or pollutants.
- n nutrient loading in areas of high agricultural use.
- n compaction and breakdown of soil structure.



Green space in urban areas should be managed as part of a larger ecosystem with efforts to conserve streams, lakes, and wetlands, and protect water quality.

Water Quality

Managing water quality in natural systems is a complex process involving not only rivers and lakes, but also the natural storage and filtering capacities of soil and vegetation. As water makes its way through these natural systems many processes take place which provide opportunities for the gradual cleansing and purification of water supplies.

n Water which soaks into the ground as part of its transportation downstream is filtered and purified and emerges as springs flowing into streams during the summer months, clean and cool.

n Many biological organisms living in streams and wetlands help to break down physical and chemical impurities in the water as part of their own life process.

Where human developments remove the opportunity for such natural filtration, alternative processes or constructed wetlands must be provided.



Soil is created over time as a product of erosion and biological processes. As the basis for the growth of plants, the quality of soil is a major determinant of natural productivity.



Habitat

Watercourses support an incredible variety of lifeforms. The same rivers and wetlands which store and transport water are rich in biodiversity - supporting fish, plant, animal, waterfowl and human species.

Aquatic Habitat

Fish, and all forms of aquatic life, have adapted to specific habitat conditions which are created as part of the seasonal flow of water in watersheds. Water quality, temperature and flows maintained in streams are essential to the preservation of productive fish stocks.

n Water temperature is moderated by cool groundwater recharge, and by shade provided from streamside vegetation.

n Groundwater recharged after heavy rains percolates slowly into streams and rivers providing a supplement to base stream flows during dry periods.

n Streams provide a variety of habitat types from swift flowing water to still backwater channels. Habitat conditions are also varied as streams change from steeply sloping lands to relatively flat lowland areas.

n The character of stream banks, and bottom texture, influence species and habitat conditions.

Upland Habitat

Beyond aquatic habitat edge, watersheds have impacts on the habitats of many upland species. The availability of water has a major influence on vegetation, and therefore on bird and animal habitat.

n Water stored in low lying wetlands supports waterfowl habitat.

n Frequent flooding reduces tree cover and provides open areas of water tolerant vegetation.

n Drier areas in the interior provide an open forest cover creating habitat suitable for large mammals.

Wildlife Corridors

Fragmentation of habitat is a common problem associated with development. As agriculture or urbanization separate and surround remnant habitat patches, species populations within these patches become more isolated. As species lose their ability to move between different habitat areas the biological safeguards offered by genetic diversity are reduced.

To mitigate against these problems, habitat corridors need to be protected to allow movement between habitat patches.

Since threats to narrow corridors are common, wherever possible more than one access corridor should be provided.

Habitat Balance

It is important to conserve a variety of habitat types as a part of a greenway system because animals are likely to use many different habitat areas as part of their daily or seasonal routines. For example:

n protecting nesting trees in wooded areas for hawks and eagles will be of little use if their hunting sites in open fields or wetlands are all converted to housing.

n providing fish ladders to upstream spawning areas will be of little value if water quality has been degraded by sedimentation or increased temperatures such that fish are unable to survive.

What Makes up Habitat?

The habitat needs of fish and wildlife are comparable with the needs of humans:

Clean land/water/air

Healthy ecosystems depend on control of pollution. Polluting substances can be as common as sediment, manure, septic runoff, paint products, fertilizers, herbicides and pesticides, fuel spills, and car exhaust.

Space

All fish and wildlife need safe spaces for feeding, reproduction, rearing, and rest. Fish require good quality and quantity of water throughout the year.

Food

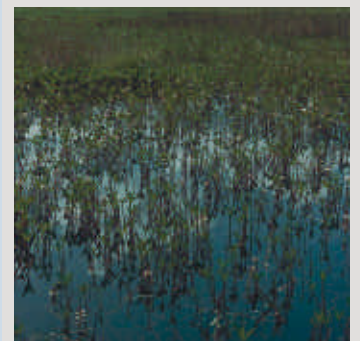
Energy from the sun combined with nutrients in the soil, water, and air provide the basis of the food web.

Cover

For fish and wildlife, vegetation provides feeding sites, shade, shelter, hiding spaces, and camouflage.

Access/Escape Routes

To survive in the long run, species need the ability to move in order to exchange genetic material with other populations, to adjust to seasonal weather or global climate change, to respond to habitat diminishment or other threats, to escape from predators, and to avoid crowding.



Clean land, air, and water are the basic elements of wildlife habitat.

Practical Benefits

Vibrant Communities

Greenway planning creates direct and indirect lifestyle benefits

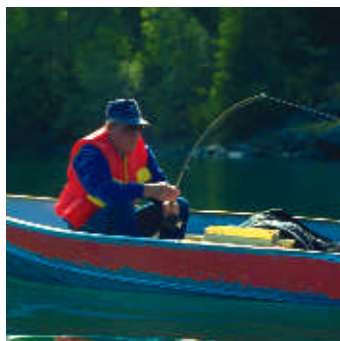
Protected green space has traditionally been provided in parks. As development progresses, these parks become increasingly isolated in the modified landscape and separate from natural areas. Greenways seek to re-establish the links between parks and larger natural areas to create a network of green space.

Quality of Life

A green space network will contribute greatly to the character and livability of urban areas. Greenways which thread their way through urban areas provide daily enjoyment of nature for many people. Natural landscapes within urban areas provide visual access to nature for everyone, and physical access to greenway trails and natural areas for people with a special interest.

Greenways can provide opportunities to enjoy:

- n** Fish and wildlife close by.
- n** Visual, spiritual and real connection to nature.
- n** Appreciations of heritage and cultural resources, such as natural heritage resources, historic sites, cultural landscapes.
- n** Relief from urban pressures - noise, crowding, bustle.



Greenways provide opportunities to get outside and participate in recreational activities or just enjoy nature.

Community Planning

Greenways can help in social planning for communities, by:

- n** Environmental education, to bring the rewards of appreciation of environmental quality across all sections of the community. Everyone has a right and a need to be proud of the community and its environment.
- n** Separation of conflicting land use - greenways provide a natural buffer between conflicting uses such as housing, industry and farmland.
- n** Livability for low-cost housing - greenways can provide open space beside higher density housing sites, enhancing the quality of life for the residents.

Community Health

Greenways play a role in preventative health programs in communities, by providing:

- n** Places for recreation and exercise.
- n** Healthy transportation alternatives.
- n** Light, fresh air, and a clean environment.

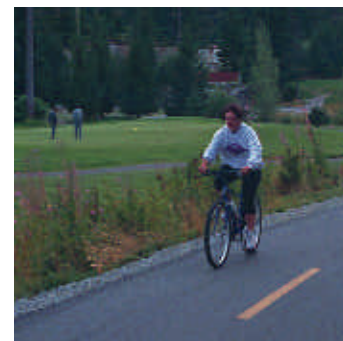
Access to these basic amenities is important for all groups in the community, but is especially precious for young families who may not have access to other forms of recreation.



Community Spirit

Greenways can contribute to the enhancement of community spirit by:

- n** Providing opportunities for community volunteer groups like Naturalists Clubs, Rotary, Lions, etc. to participate in greenway programs.
- n** Providing focus for additional community action on the environment.
- n** Creating a natural legacy for future generations, and a source of pride for our community.
- n** Neighborhood identity - by separating clusters of development, greenways create visible neighborhood edges, and encourage community spirit within neighborhoods.
- n** Community interaction - trails systems associated with greenways encourage neighbours to get outside and meet.



Greenway trails provide enjoyment and transportation alternatives.



Passive Recreation

Greenways provide a natural place for:

- n bird watching
- n wildlife viewing
- n aesthetic appreciation
- n nature interpretation

As part of a greenway program, space and soil may be available for community garden plots.

Active Recreation

Linear greenway systems can accommodate the following activities:

- n walking and jogging,
- n fishing,
- n cycling and mountain biking,
- n in-line skating,
- n equestrian trails,
- n nordic skiing,
- n snowshoeing,
- n water based recreation like canoeing, kayaking, and swimming,
- n linkages to intensive recreation areas.

As well as linear recreation, greenways provide access for children and families to nature's playground - the joy of play and discovery in natural spaces.

Greenway managers should consider noise and other negative effects of motorized recreation. Motor boats, trail bikes, ATVs and snowmobiles may be a valid use in some cases. These uses should be managed to minimize impacts on habitat and passive recreation uses.

Tourism

Greenways include many attributes which can support local or regional tourism:

- n things to see,
- n things to do,
- n things to learn.

The attractions that Greenways offer can be effective in encouraging tourists to stay that extra night.

A greenway can be a key part of a tourism destination marketing strategy. Having a greenway contributes to the image of a healthy, active, and environmentally friendly community.

Related business opportunities presented by greenways include:

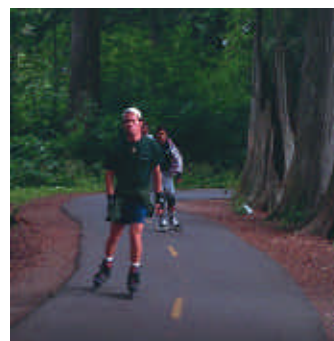
- n equipment sales and rentals (bicycles, in-line skates, cross country skis),
- n guided and interpretive tours,
- n concession and restaurant opportunities,
- n accommodation opportunities.

There is no quiet place in the white man's cities. No place to hear the unfurling of leaves in the Spring, or the rustle of insects' wings. . . And what is there to life if a man cannot hear the lonely cry of the whippoorwill or the argument of the frogs around the pond at night? . . .

Whatever befalls the earth befalls the sons of the earth. If men spit upon the ground, they spit on themselves. This we know - the earth does not belong to man, man belongs to the earth.

Man did not weave the web of life; he is merely a strand in it. Whatever he does to the web, he does to himself.

attributed to Chief Seattle



Places where waterfowl and fish are living are also enjoyable places for children and families.

Practical Benefits

Physical Infrastructure

Incorporate natural systems into infrastructure development

As communities grow, the potential for negative impacts on natural systems becomes much more acute. The construction of storm drainage, sewage treatment facilities, and roadways all affect the way natural systems function. The design of infrastructure projects undertaken with a large measure of care and respect will help to create opportunities to maximize the benefits from existing natural systems.

Planning at a Watershed Scale

Development has a major impact on the distribution of water through a natural system. Good development can reduce the impact of change, but ultimately the carrying capacity of watersheds is finite. More people not only means more infrastructure, but also much more expensive infrastructure, as the ability of the natural system to absorb change is exhausted.

The impact of development on watersheds is difficult to manage. Changes occur gradually over time and the incremental changes caused by increases in paved areas, rooftops, and stormwater piping mean that precipitation can be collected quickly and routed into streams with violent, often disruptive force.



Careful infrastructure planning will ensure that fragile water supplies, habitats and recreation resources are not damaged during urban development.

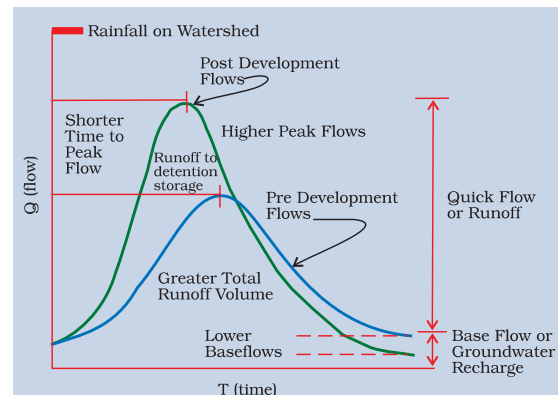
While individual changes to watersheds are minute, the cumulative effect of these changes in developed watersheds can be very substantial, causing dramatic and expensive flooding during wet periods, and droughts during the summer months. Infrastructure planning must account for future development in a watershed, and accommodate changes caused by:

- Impervious surfaces such as rooftops, and parking lots, that prevent rainwater from being absorbed by soil causing more frequent and more severe flooding.
- Increased stream flows which in turn create a need for dyking, channelization, streambank armoring, piping and other expensive protection measures.
- Stream modifications usually result in a loss of fish and wildlife habitat, and destruction of scenic resources.



In natural areas rainwater is absorbed and stored for days or weeks, reducing the impact of a storm. Rain falling on a parking lot may arrive as floodwaters in a stream within minutes.

Greenways can play a significant role in stormwater management by protecting stream corridors and floodplains, and by providing a land base for more appropriate man-made stormwater management facilities, like constructed wetlands and stormwater detention ponds.



Development can dramatically change hydrological cycles, creating alternating floods and low base flows

Water Supply

Adequate supplies of potable water can be an important limit for human development in some watersheds. Careful management is required throughout the watershed to ensure that the water supply is not diminished. The supply of good water can be affected by many factors:

- n** Loss of soil permeability during development means that base flow during dry periods will be less because groundwater recharge for streams is not possible.
- n** Efficient drainage systems created for recreation developments, agriculture, buildings, parking areas, and roads, further reduce groundwater retention and reduce base flows of streams in dry periods.
- n** The lack of summer water in streams can trap or kill fish, destroy fish habitat, and deprive licensed water users of a water supply. Greenways can provide a means to protect wetland and groundwater recharge areas in stream valleys, and when used in combination with stormwater management can provide adequate base flows for fish, wildlife and human use.



Lack of summer water in streams can trap or kill fish fry, destroy fish habitat, and deprive water license holders of water supply.

Management of Non-Point-Source Pollution

Point sources of pollutants, like sanitary sewer or industrial outfalls, are regulated by permits, and are not easily mitigated by greenways. Greenways, however, can play an effective role in mitigating non-point source pollutants like contaminated runoff from roads and parking areas, sediment, fertilizer, and chemicals.

Natural systems recycle their waste. Decaying organic matter (detritus) is the base of the aquatic food web, and organisms that decompose organic matter are critical to ecosystems.

As well as allowing these natural waste management systems to function, greenways provide filtration of man-made pollutants. Natural vegetation and soil organisms can be quite effective at absorbing or breaking down some of these pollutants before they contaminate supplies of surface water or groundwater.

While land is being developed, and in some cases even after development, the disruption, removal of vegetation, and increased stormwater flows will cause erosion and stream washouts. The loss of soil from development sites, and the deposition of sediment downstream has significant biological impacts, including destruction of fish habitat.

A buffer of trees and vegetation maintained as part of a greenway, between development and streams, provides a filter for sediment. Streamside vegetation also provides erosion control for streambanks.

Transportation Corridors

Greenways can have several transportation functions:

- n** Trails & bikeways associated with greenway systems provide an alternative to cars. Greenway walking trails and bikeways can provide shortcuts or alternative routes from home to school, convenience store, office or friends.



Utility rights of way can easily be managed to encourage greenway activities. Conversely, greenways planned in advance can provide opportunities for future utility expansion.

n Wide greenway corridors can run parallel to major transportation networks. While transportation systems will still have an impact, the noise and fumes will be separated from urban areas by the greenway, and the greenway will provide visual and safety advantages for the transportation facility.

n As linear natural spaces, greenways can operate as fish & wildlife corridors - providing fish access up and down streams, and wildlife corridors for seasonal travel or escape routes.

Utility Corridors

Hydro, underground pipeline and sewer utility corridors can form a part of a greenway system.

Utility alignments must be planned to avoid impacting fish and wildlife habitat, and therefore adequate separation between habitat and utility corridors must be planned into greenways.

Multiple use of rights of way are often used to good advantage. Whistler, for example, has combined a major valley pedestrian/bicycle trail with an underground sanitary sewer main. The trail provides a major recreational feature as well as maintenance access to the sewage system.

Greenway buffers and trails, if properly planned, can provide an inexpensive land base for future utility installation or upgrading projects.

Practical Benefits

Economic Values

Greenway planning is significant in the development of prosperous communities

Natural systems have a major influence on what communities are like, and on the way decisions are made about how they are created. Greenway planning can help to identify these natural influences and to incorporate them into an effective development plan. Including greenways as part of community plans helps to protect existing natural systems, and at the same time, create communities which are comfortable and sustainable.

Benefits of Community Greenways

Establishing greenways can be an additional cost for developing communities. On the other hand, there are many direct and indirect benefits which must also be accounted.

Economic Development

Greenways can provide a tangible advantage to communities seeking to attract or keep corporate citizens. For corporations, quality of life is the third most important factor in decisions to relocate.

The Chamber of Commerce in Sacramento, California, for example, advertises their greenway to potential corporate citizens as 'a 30 mile oasis in the heart of the city. ...at many locations along the bicycle trail you can wade into the river, cast a line, and not see a single sign of civilization.'

Particularly within British Columbia, where other factors may be equal, a well developed greenway can provide significant advantage for economic development.

Much of the growth experienced in the Okanagan, Lower Mainland, and Vancouver Island has occurred as people migrate from out of Province towards more favorable lifestyles. As a part of the BC way of life, all communities can benefit from a green space network which improves the quality of urban living.

Tourism Potential

In promoting local tourism many communities have featured greenways, park systems, and nature walkways as part of a package of local attractions.

For corporations, quality of life is the third most important factor in decisions to relocate.

(Cushman and Wakefield 1989)



Photo Credit: Real Estate Foundation

Property values near Greenways increase. More valuable properties mean increased tax revenue which can be used to offset open space acquisition costs.

Real Value Added

Throughout Canada, and particularly in the US, studies have consistently documented that greenway acquisition and maintenance costs are offset by increased property taxes due to increased value of adjacent properties.

Increased Property Tax

Increased property tax revenue can be used to offset greenbelt acquisition costs.

n In Boulder, Colorado a greenbelt acquisition of \$1.5 million dollars created an increase in property values which could have returned an annual increase in property tax revenue of \$500,000.

Many additional examples of cost effective green space acquisition have been documented. (Brabec 1992).

Growth Management

Greenways can reinforce growth management initiatives in a positive way. By defining the edges of developing areas with an attractive resource - **a Community Greenway** - planners create a positive reason to avoid expensive development sprawl. Substantial savings in public expenditures can be achieved by avoiding servicing costs for distant, low density subdivisions.

n Where greenway systems are established to embrace development clusters, the monotony of strip development can be avoided.

n Where linear greenways have been developed to provide natural connections into the centre of urban areas, improved quality of life reduces the need for people to move to the edges of cities to find a closeness to nature.

n Access to natural areas provides opportunity to encourage higher density development because of the presence of natural amenity.

A greenway program can help private landowners interested in maintaining their land in a natural condition. For example, a covenant arranged with conservation organizations can provide tax relief, as well as maintenance help and expertise.

Minimizing the Cost of Open Space

Commitments for protection of new greenway areas can be made with least cost to public or private interests by:

Advance Planning

Identify proposed greenways to be compatible with both environmental values and zoning or subdivision patterns:

n Plan greenway implementation and land use changes in concert - to minimize conflicts in land use and acquisition.

n Large scale greenway corridors outside the ALR or FLR will be more easily protected in association with large scale development, or in rural areas, or will need to be purchased as parkland;

n Existing zoning commitments should be respected - plan greenway linkages with fairness to landowners, e.g. might a candidate greenway site be gained by cluster development in co-operation with the landowner? Avoid raising expectations for large scale greenways where existing small-lot subdivision or zoning patterns make cooperative measures or purchase unrealistic.

Strategic Purchases & Acquisition

The earlier in the development process land can be acquired, usually the lower the cost:

n Identify greenway linkages in advance of development, and purchase strategic greenway properties in advance of rezoning or adjacent development;

n Consider advance purchase using general revenue. Target subsequent development cost charges for open space towards greenway improvements, or extension of the greenway system into other undeveloped areas.

n Coordinate greenways with other land needs, e.g. utility right of way or parkway alignments, transit corridors, fisheries setbacks, floodplain areas.

Tax Incentives

n Donate ESAs to conservation to trigger an income tax credit worth 50 cents per dollar donated, under proposed changes to the Federal Income Tax Act included in the 1995 budget;

n Relieve municipal land taxes in exchange for land stewardship. The Public Benefit Rating System developed in Washington State uses such local tax incentives.

Dedications and Covenants

Subdivision triggers statutory dedications of land for parks, schools and public ways, and often involves the registration of covenants to reflect negotiated restrictions.

n Plan the location of lands donated under the 5% parks and 5% schools requirements to complement greenways;

n At the OCP stage, plan for trail routings - both to provide certainty to developers and to encourage dedication of trails as public ways at the time of subdivision;

n Consider the use of covenants, without outright purchase, to limit development on environmentally sensitive parts of properties. However, at the same time, consider the rights of the property owner for use under the zoning, for the need to limit liability, and the need to enforce the covenant for it to be effective.



Private land, or land held publicly for other uses, may have conservation agreements or covenants registered against the land title, which allow non-government organizations to manage lands in ways compatible with greenway objectives.

Volunteers

Volunteerism should be encouraged in an organized greenway system.

n Encourage Non-Government Organizations to hold covenants, manage and maintain greenway lands as volunteers.

n Use landowner contact to promote volunteer stewardship.

Integrated Public Stewardship

In the presence of comprehensive green space planning, large public landholders can be encouraged to manage land to support the objectives of greenways.

n Integrate greenway planning with development plans for local forests and other resource developments;

n Work with schools, colleges, universities, hospitals, and other institutional landholders to realize greenway objectives on their holdings;

n Remember that the public street and highway system can provide key linkages as a part of a greenway system.

Integrated Private Stewardship

A cooperative private sector is a key to the affordability and acceptance of a greenway system.

n Maximize incentives - like density bonus or density averaging, or flexibility in application of regulations in response to site conditions;

n Use regulations with restraint, and with an eye to simplicity of administration. Watch for effects of proposed regulations on small or existing parcels - recognize that existing parcels should be allowed to develop or maintain a use under the zoning bylaw. Either provide relief from the regulatory requirements, or purchase land where it is unduly affected;

n Make regulations of all government levels consistent, provide certainty and fairness in administration, and recognize developments which meet greenway objectives with expeditious approvals.

... Contributions of Greenways

Greenways can be a helpful component in the management of change in developing areas. The greenway concept provides for connections between natural and developed areas, and provides for streamlined environmental regulation and protection.



... Limitations of Greenways

Success of ecosystem based planning, including greenways, will be founded on public support, financial and political, for effective conservation of critical ecosystem resources.



Planning for Community Greenways

Included in this section:

- ✓ **Introduction**
- ✓ **Vision Statement**
- ✓ **Partnerships**
- ✓ **Issues and Inventory**
- ✓ **Objectives**
- ✓ **Alternatives**
- ✓ **Strategic Plan**
- ✓ **Detail Design**

From planning and design through to implementation and management, greenways require a specialized process which can incorporate the expertise of many people. This section of the guide illustrates a planning process and suggests interdisciplinary partnerships which can refine greenway ideas and create greenway action.

Community GreenWays

Greenway Planning

Introduction

Managing complexity

Establishing a greenway program involves many issues and many people. The associated complexity can be daunting. To keep focussed and move the greenway program forward, it is necessary to have a clear understanding of a planning process and a structured approach to partnerships.

Planning in Three Cycles

The adjacent diagram illustrates three planning cycles:

Vision

At the outset of a greenway program, a vision of the purpose, location, and likely partners will be necessary. Create this vision statement based on a cursory run through the four planning steps.

The 'Vision' will evolve and become refined as Cycle 2: Strategic Plan is completed.

Strategic Plan

Once some funding and partnerships are in place based on the Vision Statement, complete a strategic planning exercise by following the four planning steps in detail. The extensive public involvement and planning studies associated with the strategic plan will lead to decisions on what actions should be taken, the location of actions, and detailed priorities and assignments of responsibilities. Produce maps, tables, reports and other communication tools to market the plan.

Detail Design

The Strategic Plan may identify individual projects to be undertaken as funds and resources allow. For example, one project might be a linear park, another an erosion control bylaw, a third a habitat restoration. Complete detail design for each of these projects using the four planning steps, this time concentrating on fine details of wording, administration or design, quality and cost control, and operations or maintenance considerations.

Four Planning Steps

Each planning cycle follows four basic planning steps. The level of detail increases with each cycle.

Decisions

Based on an evaluation of alternatives, make choices on actions and priorities.

Inventory

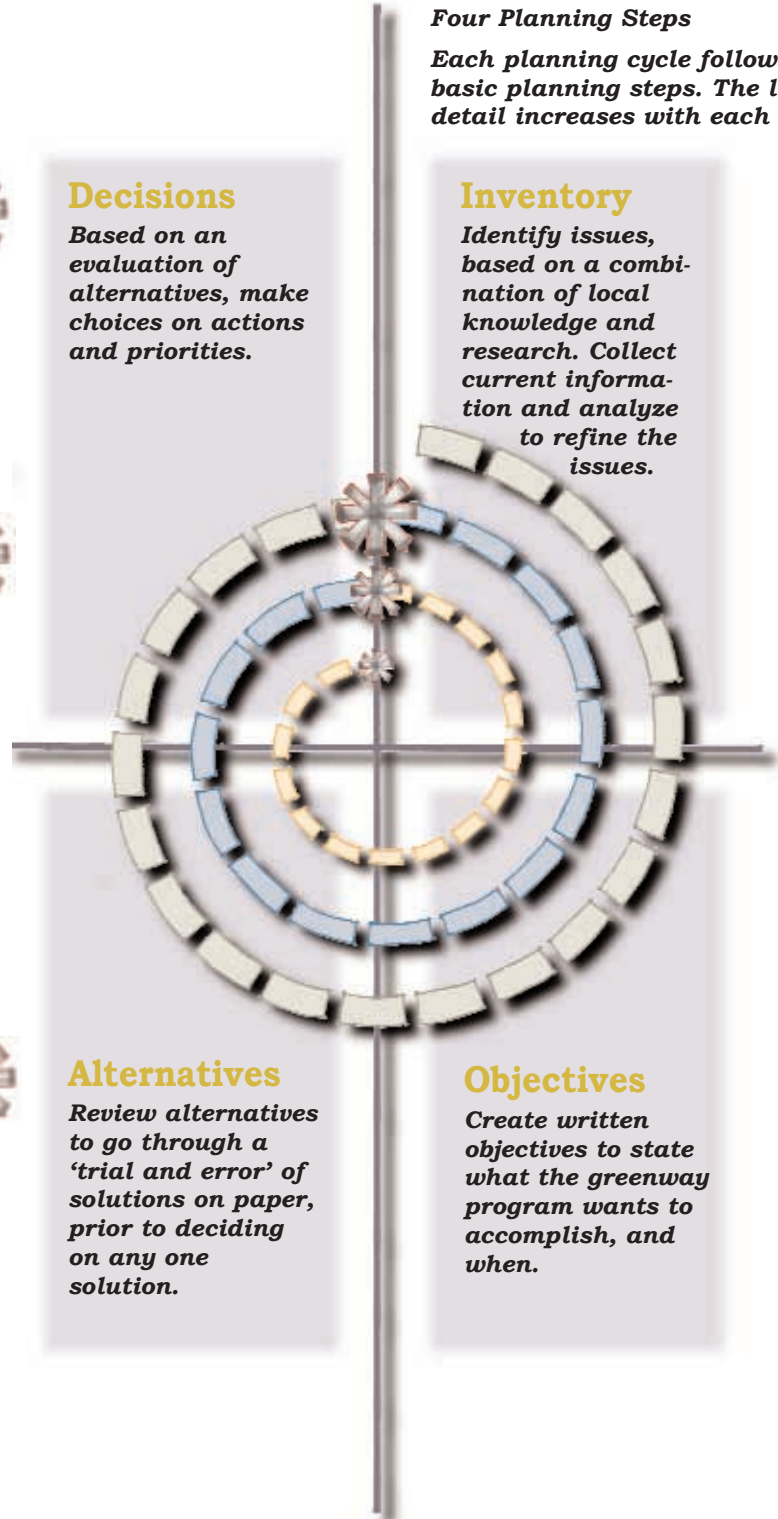
Identify issues, based on a combination of local knowledge and research. Collect current information and analyze to refine the issues.

Alternatives

Review alternatives to go through a 'trial and error' of solutions on paper, prior to deciding on any one solution.

Objectives

Create written objectives to state what the greenway program wants to accomplish, and when.



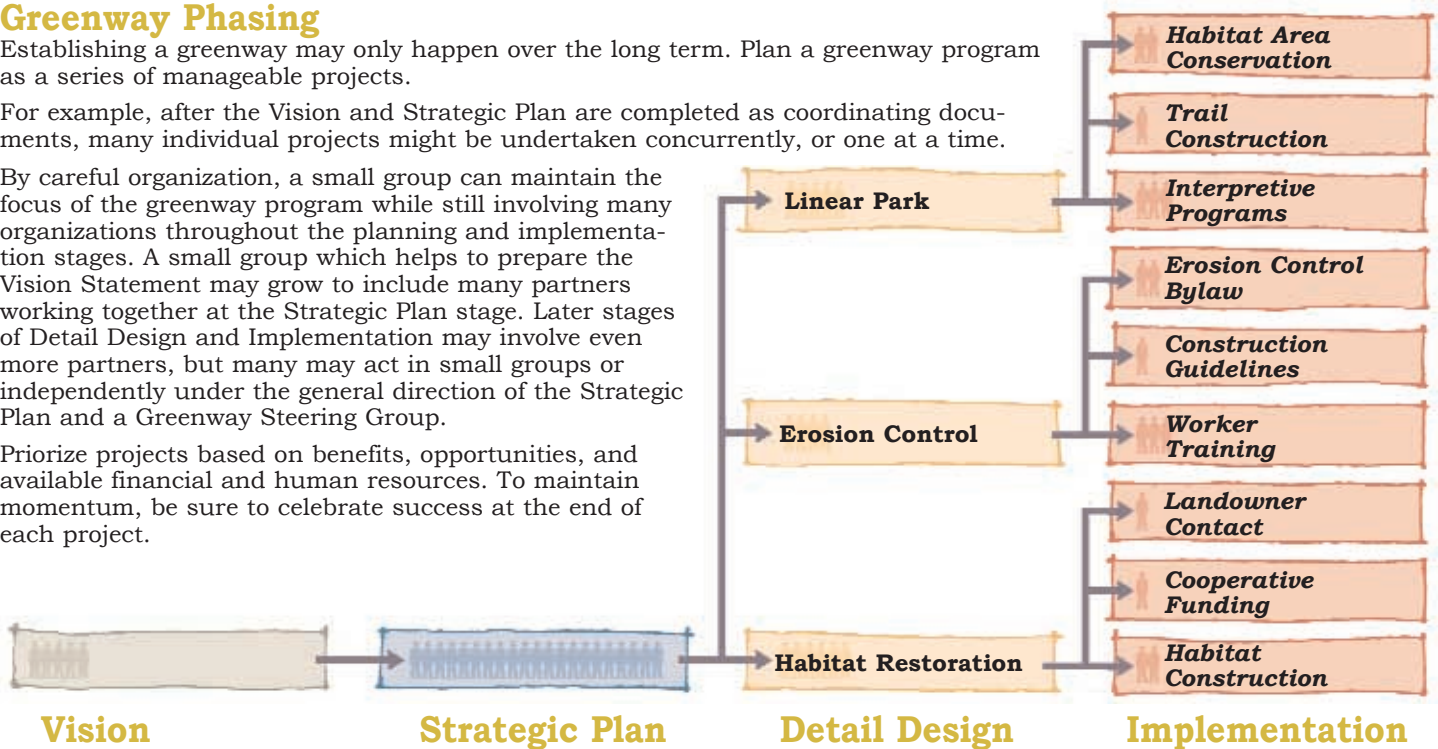
Greenway Phasing

Establishing a greenway may only happen over the long term. Plan a greenway program as a series of manageable projects.

For example, after the Vision and Strategic Plan are completed as coordinating documents, many individual projects might be undertaken concurrently, or one at a time.

By careful organization, a small group can maintain the focus of the greenway program while still involving many organizations throughout the planning and implementation stages. A small group which helps to prepare the Vision Statement may grow to include many partners working together at the Strategic Plan stage. Later stages of Detail Design and Implementation may involve even more partners, but many may act in small groups or independently under the general direction of the Strategic Plan and a Greenway Steering Group.

Prioritize projects based on benefits, opportunities, and available financial and human resources. To maintain momentum, be sure to celebrate success at the end of each project.



The Millstone Greenway

The Millstone River watershed near Nanaimo on Vancouver Island has been the site of a pilot project for planning Community Greenways. It is a typical near-urban BC watershed:

- near 100 sq.km. in size;
- about 50% working forest, 50% various rural and urban land uses under rapid development;
- with a wide variety of terrain - mountains, foothills, valleys, floodplain;
- including several lakes, wetlands, different sizes of watercourse, and a small estuary at the river mouth;
- rich with wildlife, and with fishery values both for salmon and trout;
- under many jurisdictions, including a City, Regional District, various provincial and federal agencies, as well as private, corporate and utility interests;
- undergoing rapid growth and development, with new initiatives in planning, practices and attitudes towards stewardship in all parts of the watershed.

The objective of the Millstone Greenway pilot project was to integrate a Greenway approach into the Official Community Plans of both the City and the Regional District.

Illustrations from the preliminary planning for the Millstone Greenway are used as an example in this publication.



Public Process

Watch for this icon if you are a member of a community group, or responsible for public involvement in greenway planning.

Greenways should effectively involve the general public. Be respectful of public needs for quick and concise information. Communicate through:

- Articles in newspapers
- Direct Mailing
- Individual Contacts
- Public Forums and Meetings

An information program will stimulate those who are interested enough to participate in a greenway program. Find ways for people to become involved at all levels of the process.

Greenway Planning

Vision Statement

"A vision without a task is but a dream; A task without a vision is drudgery; A vision with a task is the hope of the world." Church inscription, Sussex, England 1730

Starting with a Vision

A Greenway process starts with a few individuals with a vision - a practical dream of how a local area can be made more sustainable.

The initial vision statement and map will be based on preliminary information. Be prepared to update the vision periodically during the greenway planning process, in response to new information. Page 37 shows how the vision illustrated here evolved.

What are the issues?

Identify green space assets which are important for environmental, cultural, or recreation reasons. Analyze the related opportunities and threats to identify issues. Talk to people, find out what is important to the community. Are the issues important enough to require action?

Opportunities

Look at possibilities for linking protected areas. Identify strategies and allies which might support a greenway program. Find ways to balance other land uses with greenway objectives.

Threats

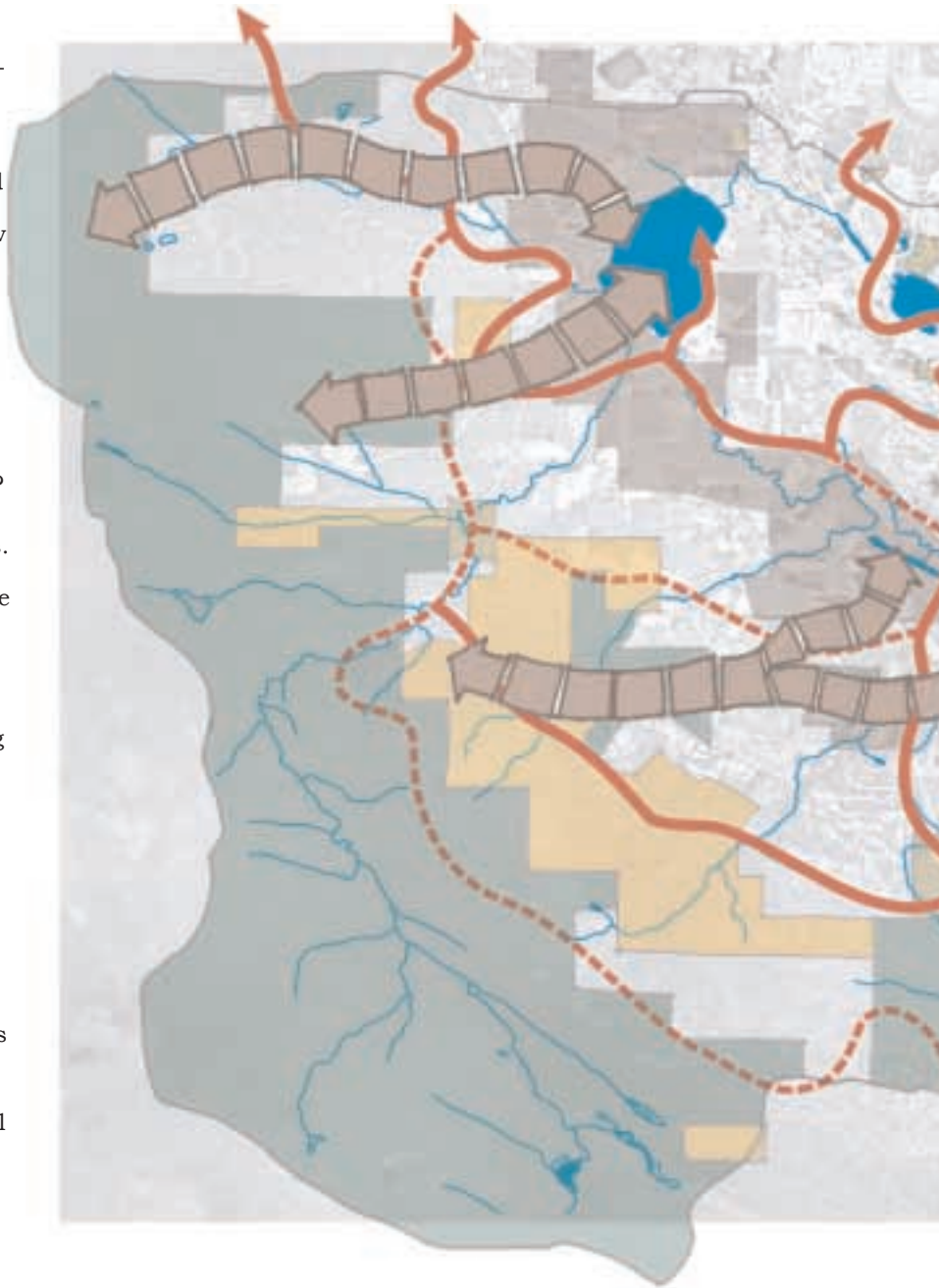
Be aware of current or planned actions which might threaten greenway assets. Rapid development or permissive zoning may be damaging riparian habitat. Informal trail networks may be threatened by new roads or development projects.

A Better Way of Doing Business

Find out what environmental agencies and planners are doing about threats and opportunities. Are the issues being well addressed? Would a greenway program help to coordinate the agencies and landowners involved? Consider the possibility of creating a greenway alliance made up of stakeholders and members of interested agencies.

Be prepared to discuss the costs and benefits of greenways. Consider the environment, social and economic development, recreation and tourism, land values, and tax revenue.

The map and legends at the right show how a simple sketch can illustrate opportunities to connect existing green spaces into a complete greenway system by focusing on key linkages - for watercourses, habitat or trails.



Prepare a vision statement to encapsulate the underlying purpose of the greenway project. This vision should become the engine that drives the process.

Existing Working Landscapes

- Agricultural Land Reserve
- Forest Land Reserve
- Provincial Forest

Existing Parks & Institutional Holdings

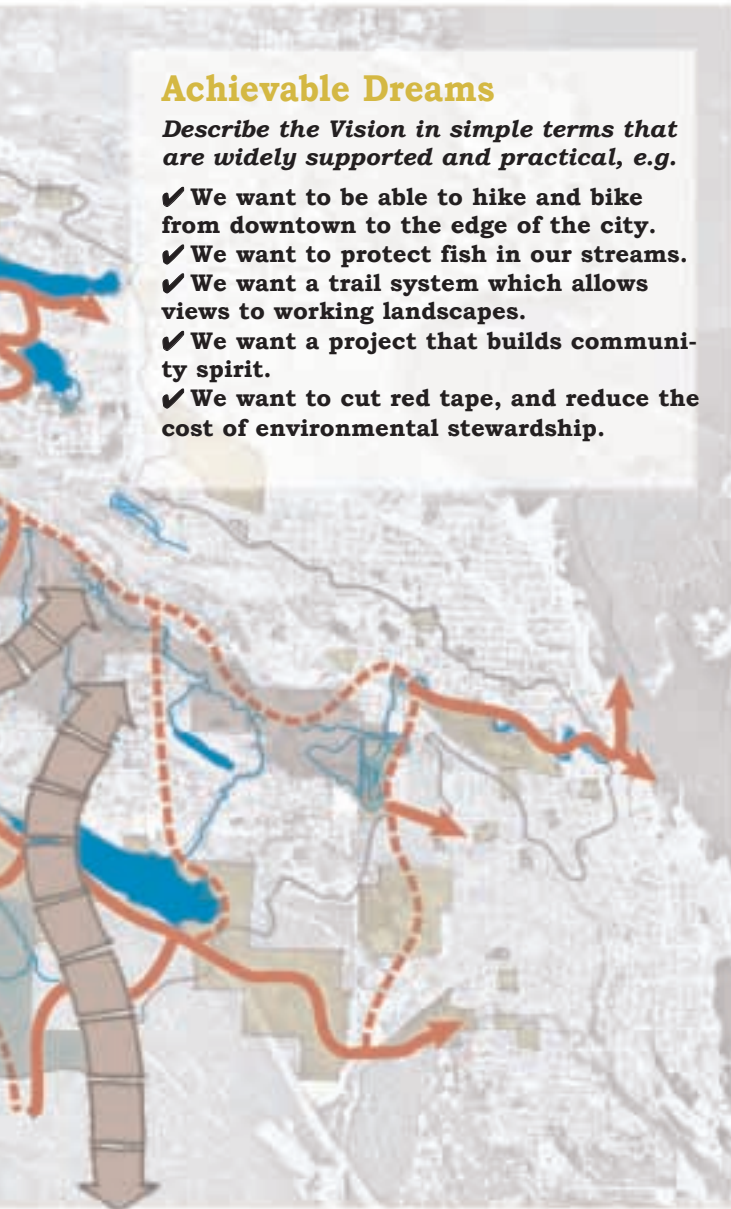
- Provincial/National Parks
- Community Parks
- Ecological Reserves
- School/Hospital Campuses
- Other Public Reserves

Existing Greenway Components

Achievable Dreams

Describe the Vision in simple terms that are widely supported and practical, e.g.

- ✓ We want to be able to hike and bike from downtown to the edge of the city.
- ✓ We want to protect fish in our streams.
- ✓ We want a trail system which allows views to working landscapes.
- ✓ We want a project that builds community spirit.
- ✓ We want to cut red tape, and reduce the cost of environmental stewardship.



Approaching Funding Partners

Some greenway programs will fall under existing mandates. Others will require fund raising. To get financial support:

- Prepare a written and graphic summary of the Vision. This submission should be concise and professional.
- Describe the Vision in physical terms. Describe the Vision in terms of benefits, costs, and administrative implications.
- Provide a work plan including a detailed budget for the tasks, and a workable schedule. Design the work plan to correspond with the mandate of the funding agencies. Suggest how the greenway could be funded by pooling together funding from existing programs.
- Be specific about how much money is required, and who the funding partners are expected to be.
- Be persistent, polite and patient.

Building Support

- Let the politicians know about your project. Build on local issues to start a community greenway group. Structure your group - keep a small working core, but let everyone participate - see page 27 for organizational approaches.
- Let the funding bodies know about the level of your support in the community.
- Avoid planning the greenway in detail as a part of the support-building process. Your objective is to raise funds for planning, not to do the planning in the absence of technical help.

Keeping Momentum

- Talk to everyone about pooling money and resources. Encourage a meeting among the potential funding partners.
- When you are turned down for funding from one source, try another. Once you have some funding, try those who initially refused.
- Keep trying - fund raising can take many months. Consider your timing - would this be more successful in a few months or in a year or two?
- Recognize when you have raised enough money to get started. Don't wait too long, or your funding sources may lose their interest or ability to participate.



Public Process

A greenway may start with anyone - a concerned individual, a community group, an environmental organization, or a planner. In the beginning, funding may be limited, so the energy of volunteers is essential to carry an idea forward until seed money can be found for in-depth planning and public participation.



Water-courses

Watershed Boundary
Rivers and Streams
Lakes
Wetlands
Floodplains



Major Potential Habitat Linkages

Other potential ESA linkages not shown:
Riparian Corridors
Minor Upland Corridors
Sensitive Areas
Habitat Restoration Areas



Potential Major Trail Linkages

Potential trail types:
Walkway
Bikeway
Equestrian Trail
Nordic Ski Trail
Multi-purpose Trail

Greenway Planning Partnerships

Can anybody remember when the times were not hard and money was not scarce?

Ralph Waldo Emerson

Greenways are integrating projects. One of their strengths is the ability to integrate the energies and resources of many parties. A greenway provides benefits for many users, but also impacts upon the decisions taken by many organizations. Because of this, greenways need to be broadly based and cooperative.

Greenway Leadership

A spontaneously formed group with enthusiasm for a particular issue is an ideal organization to start greenways. Such a group can rally support and draw together the resources for subsequent stages of greenway development.

To sustain enthusiasm over the longer term, a greenway program needs to find a more permanent structure - a formalized group, likely including many of the original supporters, that can assume responsibility to carry the idea forward. This group should have resources to provide ongoing coordination, keeping other participants and the public aware of the process as it unfolds.

Community Groups as Greenway Partners

Greenway programs rely on the motivation of the public for their success. There is a vital, and continuing, leadership role for community groups to play in seeing a greenway program from vision to reality.

Greenway programs are most powerful if they are supported by many, not just one, community group, e.g. conservation organizations, Rotary, Kinsmen, Lions or other service clubs, professional or industry associations, neighbourhood associations, recreation groups, etc. Greenway Alliances can focus the resources of these various groups to common objectives.

Getting the Word Out

As the issues relating to a particular greenway program are established it will be possible to develop a list of stakeholders with vested interests in the greenway, including adjacent landowners, government agencies, conservation organizations and interested individuals. These people should be consulted throughout the planning process and encouraged to participate in planning decisions.

Effective greenways can only be built out of this inclusive approach to land management.

Public participation costs money. Be sure that organizations are adequately funded to facilitate this public interest.

Potential Funding Partners

Greenways can help to establish efficient relationships between organizations. Given this joint benefit, funding may arrive from many unexpected sources. All levels of government and many corporations may have specific responsibilities to cooperate in a greenway program if the issues addressed by the program fall under their jurisdiction.

Government of Canada

Several federal government agencies have programs which are aimed at encouraging partnerships for Greenways and other stewardship initiatives. Partners may include:

Department of Fisheries and Oceans (DFO)

Environment Canada: Canadian Wildlife Service (CWS)

Parks Canada

Public Works Canada

Province of British Columbia

The Province provides environmental information, and direct funding. Partners may include:

Ministry of Environment, Lands and Parks (MELP)

Ministry of Forests (MOF)

Ministry of Agriculture, Fisheries and Food (MAFF)

Ministry of Municipal Affairs (MMA)

Ministry of Transportation and Highways (MOTH)

Regional Districts

Regional Districts administer land use regulation for unorganized areas, and growth management strategies. Greenways are a natural part of growth management strategies for Regional Districts. Partners may include:

Planning Departments

Parks & Recreation Departments

Engineering Departments

Administration

Municipalities

Municipal partners may include:

Planning Departments

Parks & Recreation Departments

Engineering Departments

Heritage, Environment, or Social Planning staff

Administration

First Nations may also be valuable greenway partners.

Greenway Alliances

A Greenway Alliance may be established to oversee greenway planning activities. This group could include: conservation organization, landowners, politicians, interested individuals, staff from local, provincial, and federal governments and First Nations.

The Greenway Alliance should include representation from major funding partners.

Multi-agency partnerships will normally require that a Memorandum of Understanding (MOU) will be drawn up. Keep it simple and straightforward, and ensure that it is done expeditiously.



Public Process

Start a greenway process with a few key local non-government organizations. Form an ad-hoc steering group.

After raising funding for planning and completing basic organization, expand into a Greenway Alliance, including other organizations and the general public.

Structure of a Greenway Alliance

Establish a structure for the Greenway Alliance which allows for efficient operations. Three separate, related groups might be included under the Greenway Alliance banner:

Greenway Steering Group including key representatives from the supporting groups, both government and non-government. The Steering Group would act like a Board of Directors, providing direction and decisions for the Alliance.

Greenway Technical Group A subset of the Steering Group would provide technical expertise. This might be from dedicated professionals volunteering their time, by secondment from government agencies, or by consultants.

Greenway Partners

All funding members of the component organizations of the Greenway Alliance, and other interested agencies or organizations, would be involved as Greenway Partners. Newsletters, public forums, well organized meetings, special projects and other events may be held periodically to keep the memberships of the partner organizations informed and supportive. In between these special events, the representative in the steering group would be responsible for communication with the sponsoring organization.

Staffing for a Greenway Alliance

Don't create another layer of government. Avoid creating long-term bureaucracies.

Be task oriented. Bring together the minimum number of people that can accomplish the task. When its done, disband or move to the next task.

Consider use of consultants for planning, design and management. They will be very task oriented.

Consider secondments from existing agencies. This allows supportive staff to come together on a task, and return to their agency.

Respect that agencies have limited staff, limited time, and enormous demands. Use staff time efficiently, and if a major task is involved, consider a secondment.

Ensure that the Greenway Alliance is given resources for professional planning - either staff or consultants. The considerable work required for a Greenway is too much for volunteers to do alone.

For more information

This chart introduces the major groups who may have an interest in funding a greenway program in your community. 'Community Stewardship: A Guide to Establishing Your Own Group' is a Stewardship Series guide providing detailed information on organizing and funding for community stewardship groups.

Conservation Organizations

Conservation organization partners may include:

The Federation of British Columbia Naturalists
The Nature Trust of British Columbia
Ducks Unlimited Canada
Trout Unlimited
The Pacific Salmon Foundation
The BC Wildlife Federation
Wildlife Habitat Canada
Georgia Strait Alliance

Service Organizations

Greenways can attract funding from foundations and service groups whose interests are broader than conservation. Partners may include:

Foundations like the Vancouver Foundation, the Real Estate Foundation
Rotary International
Lions Clubs
Kinsmen Clubs

Institutions

Schools, colleges and universities will be a source of energy, expertise and support. Campuses of all types can form a part of a greenway system. Partners may include:

Schools and School Districts
Colleges and Universities
Hospitals
Correctional Centres
Military Establishments

Business & Corporations

Private ventures with insight into the values of greenways may contribute. Crown corporations and utilities also recognize the value of environmental stewardship. Partners may include:

BC Hydro
Forest Renewal BC
Gas & Pipeline Utilities
Railways
Developers
Tourism Businesses

Greenway Planning

Issues and Inventory

Collecting information for the greenway process

Data collection can be an expensive part of the greenway process. The costs in time and money of collecting unnecessary data means that it is especially important to be very clear and precise about information gathering priorities.

Starting with Key Issues

The Vision Statement and initial contacts will have identified key issues which the greenway program wants to address. Design an inventory process to get the critical information to address these key issues.

Getting a Clear Picture

Existing information will provide most of the basic information required for a greenway strategic plan. However, much of the information may not be mapped, or may be at incompatible scales. Key themes to look for are:

- Land Status - what is the pattern of property boundaries? Zoning? Public Ownership? Check with local governments.
- Fish - are they present, or is there potential for re-establishment? What is the extent of riparian habitat information? Is there enough data to make initial decisions? How can further data be collected as land adjacent to streams develops?
- Wildlife - are extents of habitat adequately established? Is additional biological survey work required? Can biological survey be deferred until later in the planning process?
- Migratory Birds and Endangered Species - contact Environment Canada, BC Environment, Ducks Unlimited Canada, and others.
- B.C. Conservation Data Centre - Sensitive Ecosystems Inventory. This information is being prepared in some parts of the Province to identify rare or sensitive habitat.

Be Strategic

Collect general data at overview scales - use it to identify areas where more data is needed. Collect more specific data only in the areas where it is needed.

Collect detailed data only where absolutely necessary. Defer data collection where possible to later stages in the greenway process.

Consultants

Use consultants to provide specific information which is accurate and reliable. Be specific about terms of reference, as this information may be relatively expensive.

Volunteers

Volunteer data collection can provide a great deal of information at low cost. This provides opportunities for direct public involvement in greenways.

University Research

Establish cooperative funding for research. Consider job training programs.

Organization & Funding

It is very likely that the data needed for Greenways is needed for other projects as well. Strategic partnerships can make the data collection a shared responsibility, and a shared cost.



Defining the Issues

Once data is assembled, review of the compiled information will determine the issues.

The results of this synthesis can be presented in a Summary of Issues flyer which can be reviewed by funding agencies and the public.

The issues defined will provide a basis for determining objectives - what actions should be taken to address the issues?

Data Collection should be strategic and phased, so that delays due to collection of unnecessary data are avoided at the start of the process. Detailed information is gathered, when needed, in later planning cycles.



Low Tech Options

Most mapping and data collection now is prepared digitally. This provides great flexibility for manipulation and viewing at different scales.

However, greenway planning can still be undertaken effectively with hand drawn map sheets and overlays. These may be registered over a base map for analysis of information. Different layers of information can be displayed for different purposes.

Map Sources

Base mapping may be available as digital computer files or hard copy. Sources to consider include:

Satellite Imagery

LandSat Images
SPOT Images

Airphotos

Maps BC
Private Contractors

Terrain Resource Inventory Mapping (TRIM)

Maps BC

Environmental Mapping

MELP-Floodplains
MELP/CWS-Wildlife
MELP/DFO-Fisheries Sensitive Zones
CDC-Sensitive Ecosystems Inventory
MOF-Vegetation Cover

Local Government Mapping

Cadastral (Legal Boundaries)
Zoning & Utilities
Parks & Open Space Mapping
Public Surveys

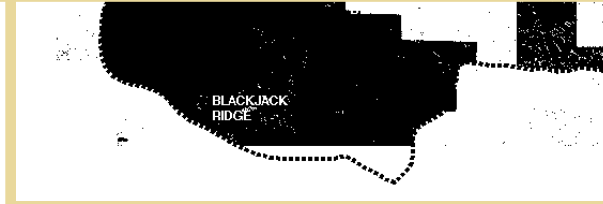
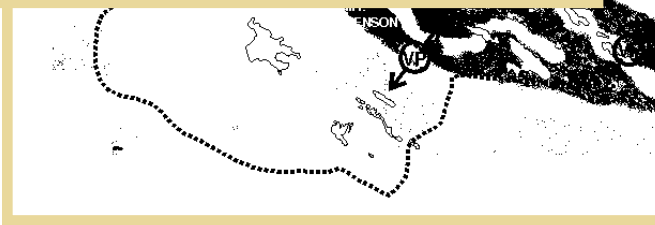
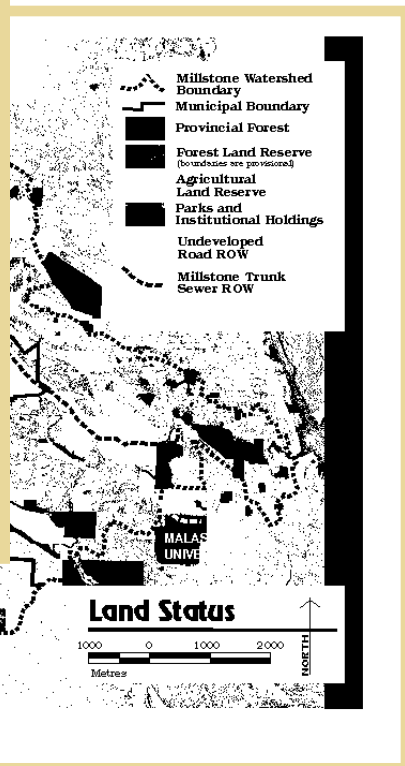
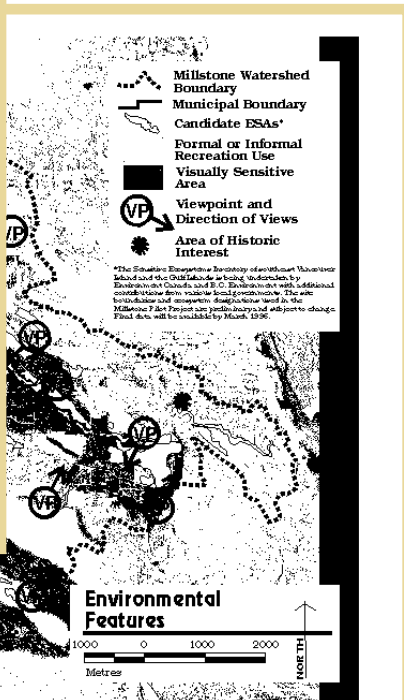
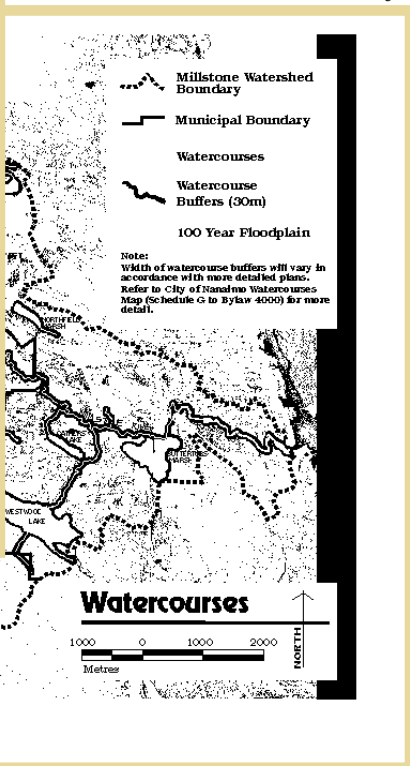
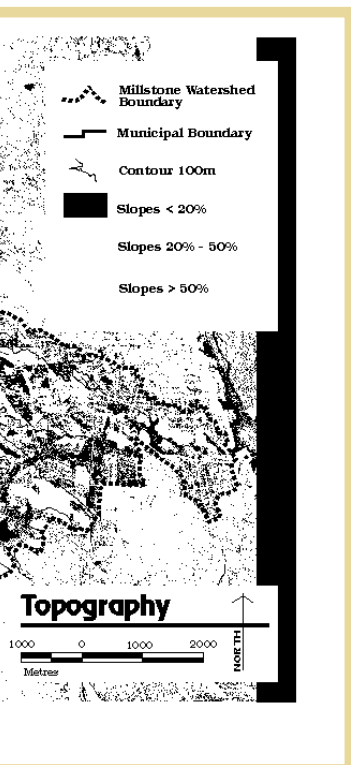


Public Process

Public groups can collect information on local values, and local knowledge of sensitive areas, historical or recreation features, through:

- Public meetings
- Focus groups
- Conservation organizations
- Direct contact with longtime residents.
- Public opinion surveys.

As well, public review of data and maps collected by agencies or consultants will help to reveal missing or inaccurate information.



Greenway Planning

Objectives

Setting out what a greenway must accomplish

Establishing meaningful and attainable objectives is an important part of the greenway planning process. Common greenway objectives, established in response to existing opportunities, and shaped by input from many people, may be the glue that keeps a greenway alliance intact, and the fuel for greenway progress.

Finding Common Objectives

To have objectives in common is to have a common purpose.

A greenway program can provide a means for divergent organizations to pool resources, expertise, and mandate towards common stewardship objectives.

Trying to find objectives that many people can agree on can be difficult. People tend to think of exceptions, possible consequences, or worst case scenarios. Different interpretations of the same words can lead to misunderstandings.

It is often easier to agree on specific actions at a specific location than it is to agree on a broad objective. This is because every objective must be applied in light of extenuating circumstances, context and hardship.

Therefore this chapter outlines how to define objectives thoroughly - to answer the questions what? when? how? and where?. By answering these questions, stakeholders are more likely to gain mutual understanding and trust, and to find common purpose.



Objectives, *Desired Actions? When?*

Objectives should have required actions and time parameters.

Criteria, *Action Details?*

Criteria provide measurable definition of how objectives will be met. These allow a clear understanding of what the objectives mean.

For Example...

To protect the riparian zone of all streams, lakes and wetlands in the community, whether fish-bearing or not, by the year 2000.

Define riparian zone:

In working forests - as defined in the Forest Practices Code
In urban settlement areas - generally as defined in the Land Development Guidelines as leave areas. This definition will be given more specific wording in local bylaws. For example, riparian leave areas might be:

- 30 to 50 metres from top of bank for major rivers and lakes, and for all industrial or commercial zoned lands.
- 20 metres from the top of bank where trail or utility alignments enter the riparian zone.
- 15 metres from top of bank for all other watercourses.

For Example...

To provide a trail system which connects the waterfront to the ridge of local foothills by the year 2005.

Define trail system components:

- Multipurpose trail - 3.0 metre or greater width, paved, for walkers, cyclists, roller blades, disabled, limited to areas of gentle topography and limited environmental sensitivity.
- Hiking/Equestrian trail - soft surface trail, concentrated in agricultural areas.
- Hiking/Biking trail - soft surface trail, designed for mountain biking and ambitious hikers.
- Walking trail - soft surface trail, skirting environmentally sensitive areas and in more urban areas.
- Shared streets - walking, hiking and cycling will be combined with local vehicle traffic on minor roads.
- Shared riparian zones - trails in riparian zones will be limited to walking trails, unless a wider riparian zone is provided.



Public Process

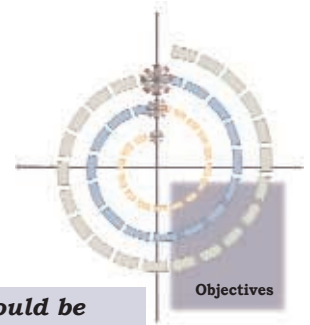
Public groups can play a major role in defining goals and objectives, in particular to help measure the will of the majority of the public.

Discuss candidate objectives clearly with an indication of costs and implications. Encourage meaningful feedback. Meet directly with affected parties to ensure mutual understanding. Consolidate input and publish a revised statement of objectives until a broad acceptance can be achieved.



A greenway objective might be:

'to protect the riparian zone of all streams in the community, whether the streams are fish bearing or not, by the year 2000.'



Objectives should be refined at each cycle in the planning process - vision statement, strategic plan, and detail design.

Implementation Strategy, How?

To provide a clear understanding of the ramifications of objectives and criteria, the table encourages the listing of potential implementation actions. This describes the tools, whether by specific land use regulation, purchase, education or incentive, the objective will be met.

This approach encourages both the design of achievable objectives, as well as identifying potential barriers which may be worth challenging.

In the City:

- Tree Protection Bylaw
- Soil Removal and Deposition Bylaws
- Watercourse Bylaw, or integrated equivalents of the above

In the Regional District:

- Development Permits

In both the City and the Regional District:

- Comprehensive Development Permits and Density Bonus Zones
- Setback Clauses in the Zoning Bylaw
- Direct purchase in some cases where existing small lots are unduly affected by regulations.

In the City and Regional District:

- On large development sites, incentive will be given to dedicate and construct trails through Comprehensive Development and Density Bonus designations.
- On small development sites, the trail right of way will be gained by dedication as a 'highway', with construction of the trail by volunteer or public funding.
- On non-development sites, trail r.o.w. will be purchased.
- On ALR lands, trails will be fenced, and closed down to dusk.
- In working forests, trails will be planned in partnership with the landholder, and constructed by volunteer funding.

Management Areas, Where?

A close study of objectives, criteria and implementation actions will reveal that solutions will vary in different parts of the greenway system.

Using a general map of the potential greenway, define different Management Areas. Each Management Area might have the same general conditions of biophysical assets, land use, ownership, etc. Identifying these Management Areas, and correlating objectives and implementation actions to them, allows objectives to become more focused.

This process also allows for exceptions to the application of objectives.

Map Units 1, 2, 5, 8.

- All riparian zones on private development property.
- On lands covered by the Forest Practices Code, FPC standards apply.
- In the ALR - development permit wording will exclude existing agricultural operations, including those existing in the riparian zone which meet the BCMAFF 'Environmental Guidelines', from requiring a permit. New agricultural operations in riparian zones would require a development permit.

Map Units 3,5,10.

- Trails will be outside riparian zones except along the river valley, east side.
- On lands covered by the Forest Practices Code, FPC standards concerning recreation and related planning apply to determining final trail location.
- In the ALR - trails will be located, where possible, to buffer urban development from active agricultural operations.

Greenway Planning

Alternatives

Concentrating limited human resources on limited natural resources

The Alternatives section of Greenway planning will study in detail the questions ‘What, Where?, How? Who?’. Alternatives for policies, physical plans, implementation strategies, and roles should be reviewed.

Policy Alternatives

What actions should be taken?

Once objectives are known, decisions need to be made on the actions required to implement the objectives. The chart at the right shows a sample of issues, and two alternative lists of policy actions.

Review the two alternatives. Each has a philosophical bent - Alt. 1 is a cautious, minimal greenway approach, and Alt. 2 adds more comprehensive actions.

Each local government will develop policies which suit its circumstances - politically, environmentally and economically. A conscious review of policy alternatives should include an assessment including the two following questions:

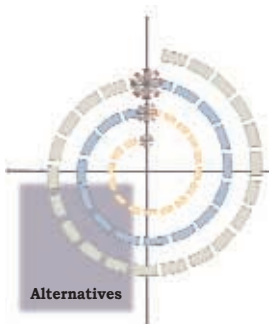
What impact will this policy alternative have on people?

What impact will this policy have on other species?

A policy alternative that provides benefits for both people and other species, at an acceptable cost, will be the most sustainable.

Often policy discussions will focus on ‘how far to go’ towards an objective. Each greenway program will have a customized set of policies.

Issues	Policy Alternative 1	Policy Alternative 2 includes Alt. 1 Actions, plus:
Life Support for Fish & Wildlife <ul style="list-style-type: none"> ■ aquatic/upland leave areas. ■ water quality and quantity. ■ instream works/fish passage ■ wildlife corridors. ■ backyard wildlife. 	Moderate local role <ul style="list-style-type: none"> ■ identify ESAs in OCP/zoning. ■ encourage ESA dedication to senior agencies. 	Strong local role <ul style="list-style-type: none"> ■ public education / NGO partnerships. ■ stewardship bylaws. ■ some direct purchase and restoration.
Protecting Water Resources <ul style="list-style-type: none"> ■ sedimentation/water quality. ■ adequate base flows. ■ water use/water licenses. ■ floodplain management. ■ stormwater detention. 	Mitigation <ul style="list-style-type: none"> ■ open streams policy. ■ stormwater management required of developer. ■ promote use of Land Development Guidelines. 	Watershed Management <ul style="list-style-type: none"> ■ limit floodplain development. ■ community stormwater detention. ■ promote water quality/conservation awareness.
Recreation Opportunities <ul style="list-style-type: none"> ■ manicured vs. natural parks. ■ linear open space system. ■ trails system design and users. ■ trails vs. habitat areas. 	Traditional Parks System <ul style="list-style-type: none"> ■ some parks drive-to only. ■ trails in parks only. ■ limited linear park acquisition. ■ existing habitat areas in parks conserved. 	Integrated System <ul style="list-style-type: none"> ■ habitat areas encouraged for parks & covenants. ■ integrated loop trails/green space network. ■ interpretive program. ■ walk or bike to all parks.
Heritage & Aesthetic Resources <ul style="list-style-type: none"> ■ protecting scenic areas. ■ protecting historic sites. ■ promoting cultural sites. ■ managing views and vistas. ■ buffering unsightly uses. 	Encourage Conservation <ul style="list-style-type: none"> ■ inventory key heritage/aesthetic resources in OCP. ■ include density bonus or other incentives for resource conservation. 	Making It a Priority <ul style="list-style-type: none"> ■ link scenic/cultural sites to trails system. ■ regulate for aesthetics and heritage conservation. ■ awareness campaign. ■ some public investment.
Growth Management <ul style="list-style-type: none"> ■ avoiding sprawl. ■ minimizing automobile use. ■ mixed use urban villages. ■ densification where desirable ■ natural areas close by. 	Basic Growth Management <ul style="list-style-type: none"> ■ avoid premature zoning/servicing. ■ natural areas as 5% park. ■ support senior agency requirements for developers to mitigate against impacts. 	Active Growth Management <ul style="list-style-type: none"> ■ set urban containment boundaries. ■ promote mixed use villages/densification where planned. ■ avoid rezonings outside densification areas.
Economic Vitality <ul style="list-style-type: none"> ■ maintain agricultural lands. ■ maintain forestry lands. ■ maintain fish production. ■ economic diversification. ■ sustainable development. 	Limited Local Role <ul style="list-style-type: none"> ■ leave senior agencies to manage resource lands. ■ encourage moderate, continuous growth and community development. 	Promote Local Involvement <ul style="list-style-type: none"> ■ protect resource lands by zoning. ■ promote jobs attracted by quality of life. ■ promote economic diversification.



Alternative policies and physical layouts should be reviewed at each cycle in the planning process - vision statement, strategic plan, and detail design.

Plan Alternatives

Where should actions be taken?

The maps at the right show two alternative physical plans for a part of a greenway system. The plans illustrate physical variables, such as:

■ Conservation Corridor boundaries. What lands are sensitive enough to warrant conservation status? What are the criteria for this status? How will conservation be gained?

■ Sensitive Area boundaries. These would be areas where land use is supported, with special management encouraged by public awareness or bylaw. How large should these areas be? How much intervention with private landowners is appropriate?

■ Trail alignments and use categories, or seasonal use variations.

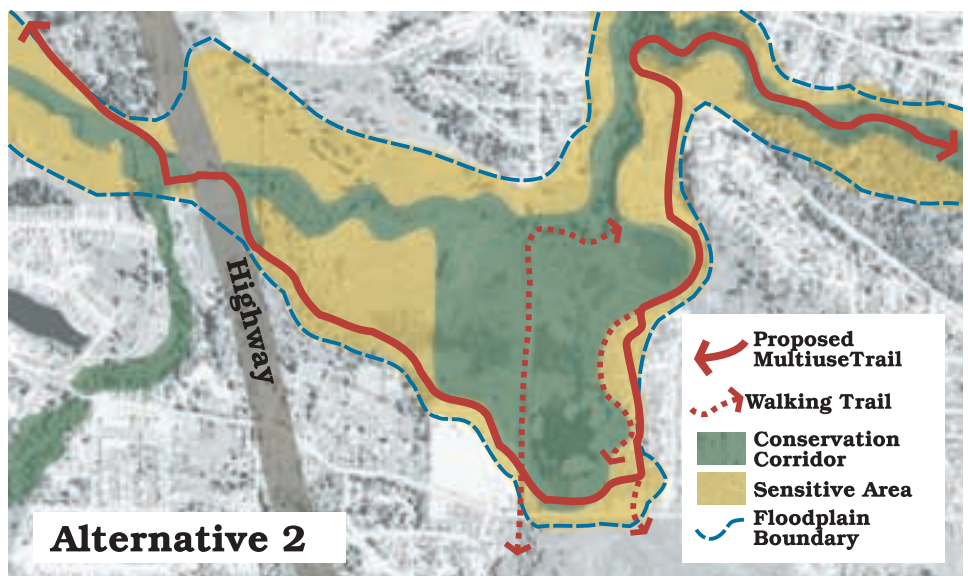
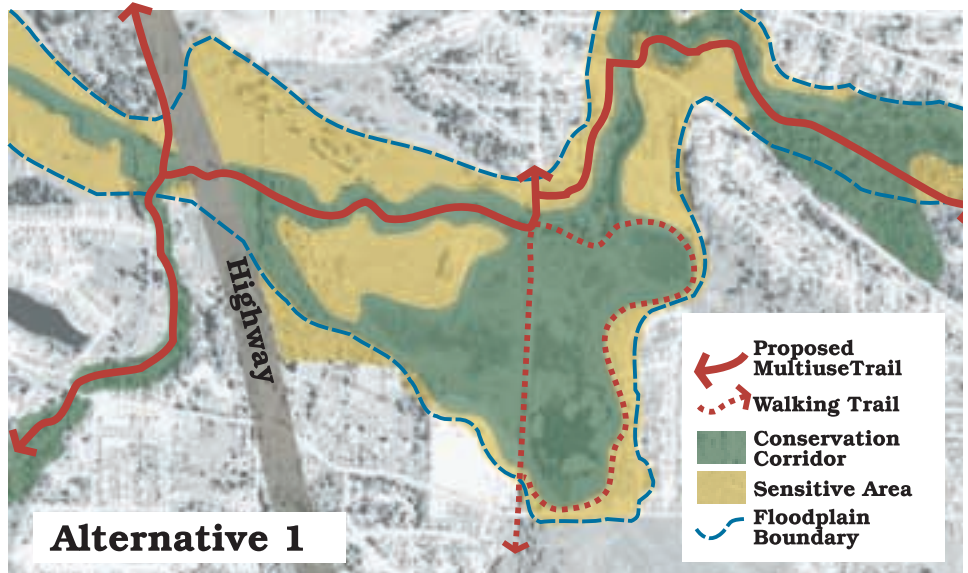
Analysis of physical plan alternatives will reveal a need to determine how much land area should be included in a greenway system, and how it should be categorized. This assessment must account for prior land use and zoning commitments.

Many alternatives may be sketched quickly, to refine criteria for greenway classifications, and to allow creative solutions to be found.

Only the most realistic alternatives should be documented for further assessment.



Greenway programs must manage not only a mapped greenway corridor, but also threats - like erosion, changes to flow regimes due to impervious surfaces, or pollutants - which may originate outside the greenway corridor but have a dramatic impact on streams which form the backbone of a greenway system.



These two illustrations are taken from the Millstone Pilot and show alternative trail alignments, conservation corridors and sensitive area management boundaries. By evaluating many alternatives, the most appropriate and productive solutions can be developed.

Mapping Limitations

A key point in a greenway program is an understanding that mapping cannot show all required actions in a greenway program.

Some impacts of land development or resource use, such as erosion, sedimentation, water quality, and water quantity as related to impervious surface and stormwater management, must be addressed outside of the mapped areas of the greenway. For these issues, efforts should extend beyond the physical boundary of the greenway corridor, for the sake of the long term environmental health of not only the greenway, but the community at large.

Implementation Alternatives, *How can actions be accomplished?*

Implementation alternatives should consider what relative emphasis should be placed on planning and public awareness, land use regulation, and public investment.

To be effective, stewardship must occur before, during and after development. The developer is not the only agent of damage to sensitive areas - tree cutting, erosion, and other incrementally harmful actions can occur without any formal development taking place.

The implementation program should also include strategies to minimize environmental impacts from development outside of the greenway corridor.

Greenway Stewardship Program	Before Development	During Development	After Development
<p>Planning and Public Awareness</p>	<ul style="list-style-type: none"> ■ awareness campaigns including media communications, counter information, community events, public and interagency meetings. ■ incorporate stewardship policies into the OCP. ■ prepare best management practices information materials, with related stakeholder training. 	<ul style="list-style-type: none"> ■ plan review. ■ staff/landowner contact. ■ advisory review panels. ■ public review meetings. ■ negotiation of approvals. 	<ul style="list-style-type: none"> ■ neighbourhood meetings. ■ strata council contact.
<p>Land Use Regulation</p>	<p>Update land use regulations to implement stewardship policies, including:</p> <ul style="list-style-type: none"> ■ zoning bylaw use setbacks. ■ tree cutting bylaw. ■ erosion control bylaw. ■ watercourse bylaw. 	<p>Bylaw requirements are implemented, including:</p> <ul style="list-style-type: none"> ■ leave area conservation. ■ trails dedication. ■ stormwater management. ■ erosion control. ■ habitat restoration. ■ development cost charges. ■ referrals if necessary. 	<p>Land use regulations continue to effect land use, including:</p> <ul style="list-style-type: none"> ■ zoning bylaw use setbacks. ■ tree cutting bylaw. ■ erosion control bylaw. ■ watercourse bylaw.
<p>Public Capital Investment (including volunteers working in the public interest)</p>	<ul style="list-style-type: none"> ■ community stormwater detention. ■ advance purchase or land trust arrangements for key ESAs. 	<ul style="list-style-type: none"> ■ purchase trail right of way if required. ■ develop main trails. ■ purchase or land trust arrangements for key ESAs. 	<ul style="list-style-type: none"> ■ upgrade main trails. ■ upgrade habitat. ■ interpretive programs. ■ develop minor trails. ■ maintenance.

Alternative Roles, *Who can implement the actions?*

Given the multi-stakeholder nature of greenways, there are many alternatives for who does what. One of the strengths of the greenway approach is the ability of the stakeholders to define for themselves what role they can best play. The Roles table below can be expanded and adjusted to try several alternatives.

Greenway Roles	Proposed Action	Action Leader	Action Assistant
Planning and Public Awareness	<ul style="list-style-type: none"> ■ identify ESAs. ■ greenway strategic plan. ■ update OCP. ■ detail designs. ■ key landowner contact. ■ water quality awareness program. 	<ul style="list-style-type: none"> ■ BC Environment ■ Greenway Alliance (joint) ■ City & Region Planning ■ City & Region Parks ■ Conservation Org. 1 ■ City Engineering 	<ul style="list-style-type: none"> ■ DFO & CWS ■ Consultant ■ City & Region Parks ■ City Engineering ■ Conservation Org. 2 ■ Region Engineering, BC Environment
Land Use Regulation	<ul style="list-style-type: none"> ■ development permits ■ stewardship bylaws. ■ update zoning bylaw. ■ update subdivision standards. ■ apply Forest Practices Code. 	<ul style="list-style-type: none"> ■ Region Planning ■ City Planning ■ City Planning ■ City Engineering and Approving Officer ■ BC Forest Service and Forest Land Commission 	<ul style="list-style-type: none"> ■ Municipal Affairs ■ Municipal Affairs ■ BC Environment ■ Local trust (to hold and enforce covenants) ■ Local Trail Club (to assist in route identification)
Public Investment (including volunteers working in the public interest)	<ul style="list-style-type: none"> ■ purchase ESA. ■ purchase trail r.o.w. ■ restore riparian habitat. ■ construct valley trails. ■ construct ridge trails. ■ install detention ponds and constructed wetlands. 	<ul style="list-style-type: none"> ■ The Nature Trust of BC ■ City & Region Parks ■ Trout Unlimited ■ City Parks ■ BC Forest Service ■ City Engineering 	<ul style="list-style-type: none"> ■ Habitat Conserv. Fund ■ Rotary Club ■ Action 21 ■ City Engineering ■ Correctional Centre ■ Developers through Development Cost Charges

Evaluation of Alternatives

Decisions on which alternatives to pursue should be based on several evaluations.

Consensus

Most greenway decisions can be made by consensus techniques. Favorable alternatives will likely be supported by all parts of the Greenway Alliance, including the Greenway Steering Group, the Greenway Technical Group, and Greenway Partners.

Public and Interest Group Review

Public review meetings and workshops will allow interested individuals and groups to gain information and express their opinion first hand.

Mailouts and brochures which encourage public response can gauge public opinion.

For an indication of the opinion of the 'silent majority', a statistically valid questionnaire is one of the few tools available.

Direct contact with key landowners can also be an important step to both accurately convey greenway plans, and to assess landowner support.

Project Feasibility

Bringing a greenway to reality requires an awareness of the threats to the project, and steering the greenway plan to manage those threats.

To be implemented, greenway budgets and expectations of government and non-government financial support must be realistic.

In the final analysis, greenways will proceed if they receive the support of politicians - at both local and senior government levels. Their support will be reliant upon broad public interest, which is generated by an inclusive approach to greenway planning.



Public Process

Public groups and public meetings can refine evaluation of alternatives. Non-government organizations can undertake public opinion surveys to gauge the resistance to greenway ideas and management actions, and also to gauge support.

Review of alternatives by the public may lead to new, better alternatives coming forward.

As a member of the public, be active in review of alternatives.

Greenway Planning

Strategic Plan

Defining the Vision and an Action Plan to focus future efforts

Greenway Programs are not static - like the ecology they work with, they evolve. Greenway Strategic Plans refine the Greenway Vision, and identify management areas and related action plans. Each greenway system will have its own mix of priorities and solutions.

Focusing the Vision

At the end of the strategic planning cycle, update the Greenway Vision to reflect the information generated. Use simple maps, photographs, drawings and graphics to make the plan as understandable as possible. Clearly identify what the Greenway Vision will change, and what it will leave as exists.

The maps shown below are a refinement of the initial Greenway Vision on page 24, based on the Inventory, Objectives and Alternatives reviewed during the planning process.

Greenway Strategic Plan maps should be schematic in nature, showing the general location only of existing and proposed greenways. The exact location of these elements should be the subject of future detailed designs for each greenway phase.

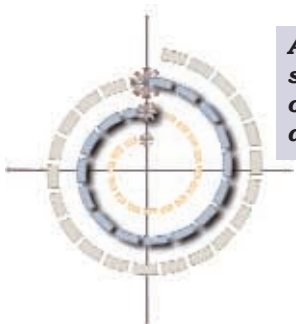
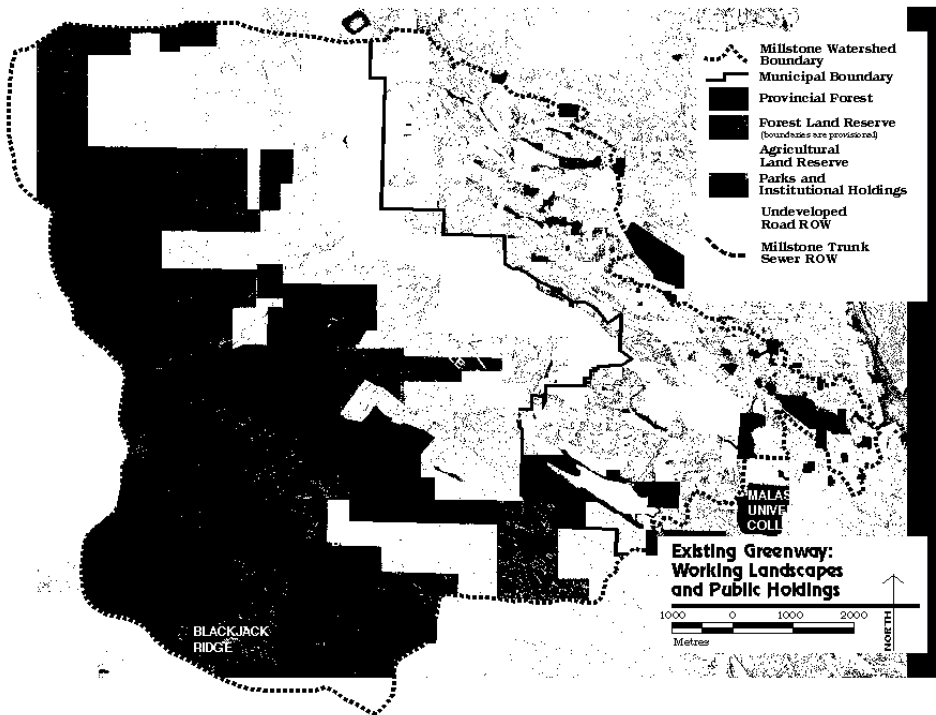
Existing Greenways

Existing ALR, FLR and public green space holdings are not physically or administratively altered by a greenway designation. However, they form a backdrop to greenway functions, and should be recognized as a precious part of the greenway system.

Proposed Greenways

The maps below show the two main components of a Greenway system - sensitive area networks, and recreation networks.

The existing and proposed greenway maps, read together, illustrate a coordinated greenway plan.



A strategic plan should provide a structure for the greenway overall, and identify critical areas for immediate action.

Proposed Greenway Components

Sensitive Area Networks

■ Conservation Corridors are areas where natural habitat is maintained, generally in riparian areas along watercourses. The width of conservation corridors would vary with adjacent land use and terrain.

■ Biodiversity Corridors are major linkages between natural areas in the watershed, to avoid the fragmentation of habitat by urbanization. Biodiversity corridors allow for movement of species - large and small, plant and animal - for escape or for species renewal. These areas will include land uses such as forestry, agriculture, and utility right of ways, and can also include cluster or open-space subdivisions if habitat links are maintained.

■ Other Sensitive Areas include floodplains, areas of steep or hazardous terrain, other ESAs, visually sensitive areas such as shorelines or

ridges, areas of high recreational value, and linkages among these. Special care in land management applies to use in these areas.

■ Habitat Restoration Areas are locations where revegetation, erosion control, fencing, or similar projects would restore the function of damaged ESAs.

Recreation Networks

■ Proposed Trails link major recreation destinations in the watershed but skirt or avoid sensitive areas or incompatible land uses.

■ Potential Trail Alignment illustrates routes where further study or land use decisions are required prior to a decision on an alignment.

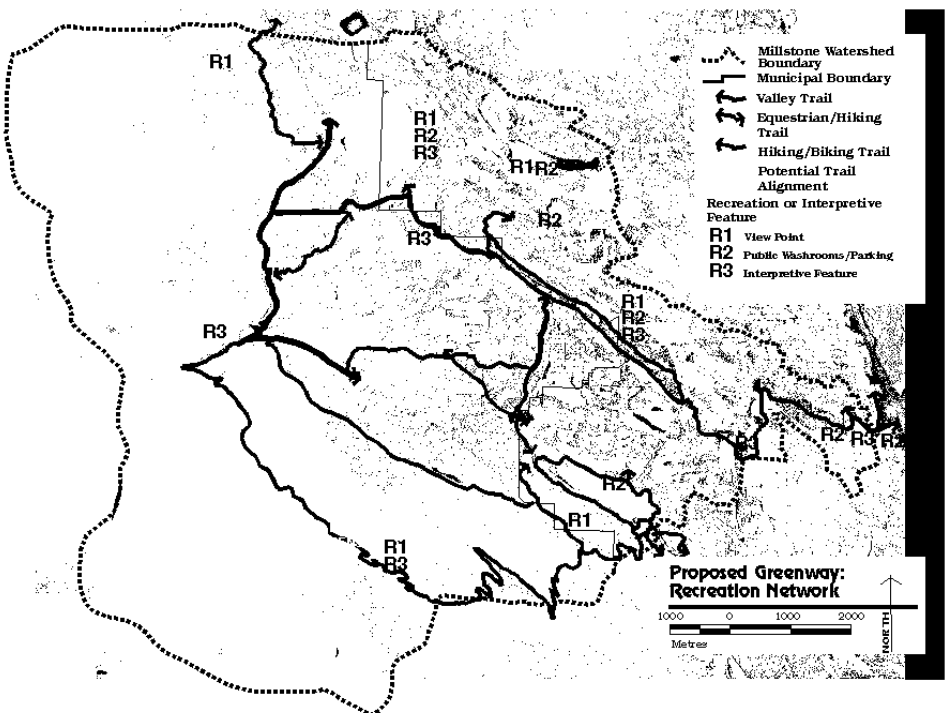
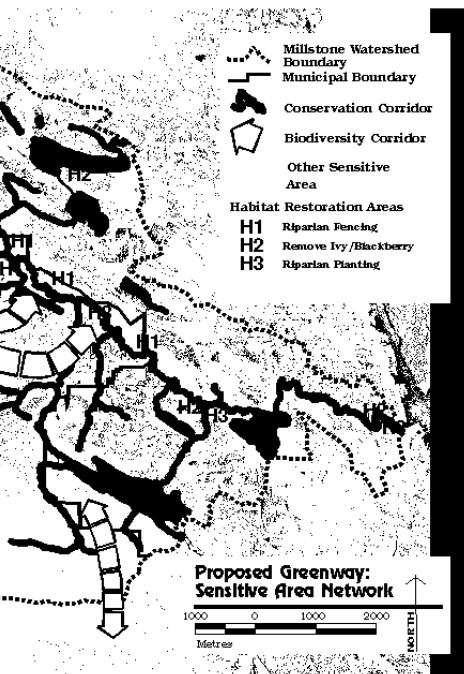
■ Recreation or Interpretive Features include facilities like benches, washrooms, limited parking, viewpoints, and interpretive kiosks or signage and similar public amenities.



Public Process

Public groups and individuals can make the Strategic Plan reality by:

- Contact with decision makers to support the program.
- Providing positive press stories.
- Assisting in landowner contact programs and fundraising.
- Volunteering to act as a contractor for implementation projects.



Strategic Action Plan

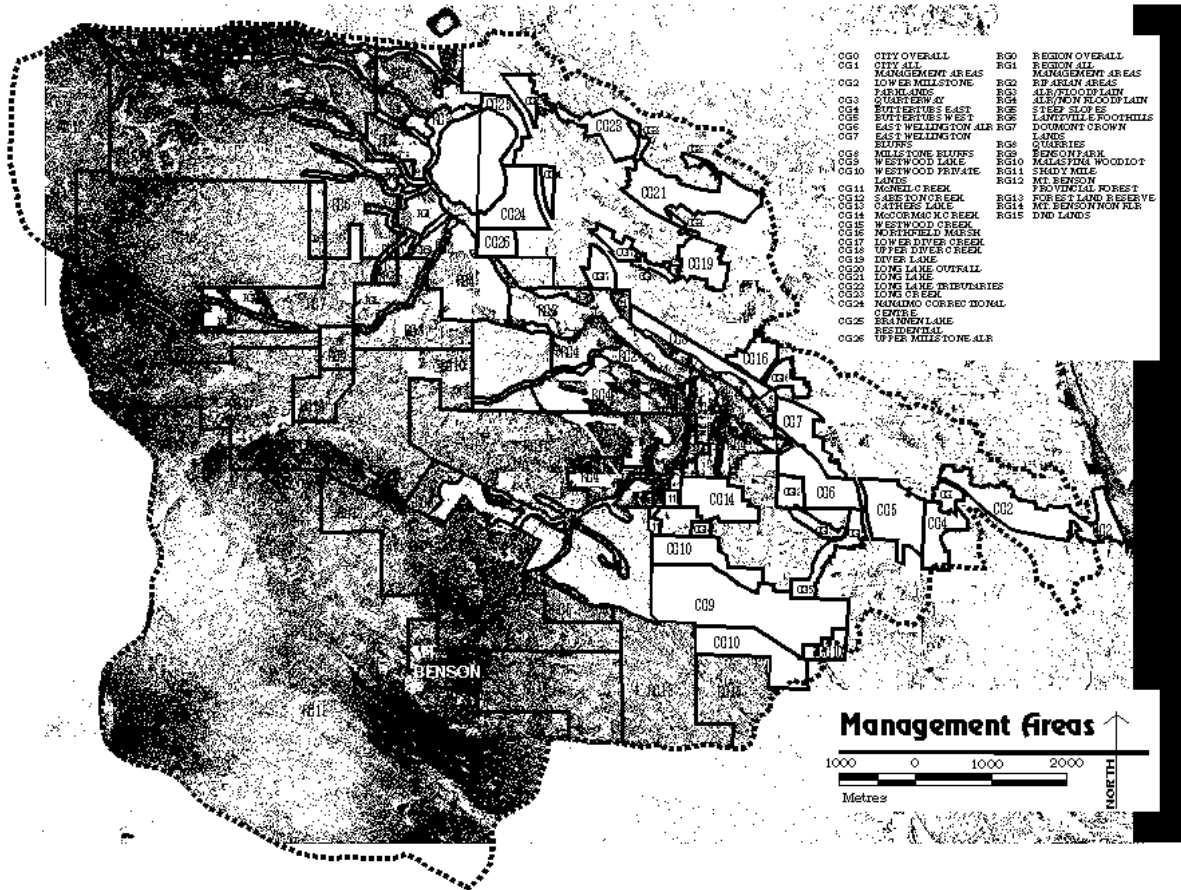
The Greenway Strategic Plan should answer five key questions:

- What action is required?
- Where does the action apply?
- How will the action be implemented?
- Who will fund, manage and complete the action?
- When will the action occur?

This section shows the use of a map and chart to summarize the chosen actions.

Note:

In addition to action within these management areas, some impacts (e.g. erosion, stormwater quality and quantity) must be addressed by actions outside the greenway corridors, and throughout the community. For these reasons the Action Chart includes actions for the City Overall and Region Overall.



Management Areas Map

The Management Area Map identifies geographic units along the greenway corridor for special attention.

The map shows separate series of management areas for the City (CG1, CG2, etc.) and for the Regional District (RG1, RG2, etc.), to recognize administrative differences.

Actions are assigned to these management areas in the Action Chart on the facing page.

Changing Attitudes - Creating Action

Greenway Planning will create a new way of seeing - an ecological approach to planning. Allow this change in attitude to gradually take hold.

But to help the attitude shift, proceed with action as soon as possible.

The planning process will have created momentum. Maintain the momentum and move quickly into implementation.

Greenways, as integrating projects, may not be subject to approvals as a whole. Approvals for individual implementing projects can be sought one at a time.

Identify immediate projects, and proceed with detail design and implementation while funding and approvals for other projects are being negotiated.

Actions

	CG0 City Overall	CG1 City All MAs	CG2 Parklands	CG3 Redevelopment	CG4 Wetland Area	CG5 ALR	CG7 Bluffs	CG9 Lake Park	Etc.	City Action Leader	RG0 Region Overall	RG1 Region All MAs	RG2 Riparian Area	RG3 Floodplain	RG13 FLR	Etc.	Regional District Action Leader
Planning and Public Awareness																	
Identify ESA study area boundaries	1									B.C. Environment							DFO/DOE/CWS
Prepare Greenway Strategic Plan	1									City Planning	1						Reg. Planning
Complete Neighbourhood Plan				3	1		4			City Planning				3			Reg. Planning
Perform water quality awareness program	2									City Engineering			2	2			City Engineering
Provide landowner contact regarding riparian management			3		1	2		5		Volunteer Org.			2	2			Volunteer Org.
Etc.																	
Public Investment																	
Procure ESA tenure				4	2					City Land Agent							Reg. Administration
Purchase trail right of way							1	3		City Parks				2	4		Reg. Parks
Restore riparian habitat					2					Volunteer Org.			5				Volunteer Org.
Install community detention ponds		1						4		City Engineering				3			Reg. Engineering
Etc.																	
Land Use Regulation																	
Establish Development Permit areas for riparian areas	1									City Planning							Reg. Planning
Require trail right of way dedication at subdivision				2						Approving Officer			1				Approving Officer
Adopt stewardship Bylaws to regulate erosion/water quality	2									City Environ. Officer							Reg. Planning
Etc.																	

Action Development Chart

Action locations, priorities and action leaders and shown on the Action Chart.

Action Locations

Community Overall:

Several actions must be applied throughout the community to support both the greenway corridor and the general community ecosystem.

All Management Areas:

Many actions will apply to all management areas in the greenway corridor.

Specific Management Areas (1, 2, 3, etc.)

Some actions will apply only to specific management areas. This is a good way to deal with special circumstances, or exceptions to general policies.

Action Priorities

Within the table, actions are prioritized, with 1 being highest priority and 5 lowest. A blank cell means that the action does not apply to that management area.

Action Leaders

An Action Leader is designated for each action. Although the Action Leader may be assisted by others, it is their responsibility to see that the task is done, and to coordinate with others.

Management Actions

The categories of Management Actions can vary with circumstances. The chart shows three general areas:

Planning & Public Awareness

Planning tools include producing the Greenway Strategic Plan and more detailed neighbourhood plans, and related interagency agreements.

Public awareness programs can lead to a major improvement in treatment of ESAs in all areas, and particularly in areas where land use regulation is not politically acceptable.

Public Investment

Public investment can include both government and volunteer investment, both in time and in money, for trail and habitat improvements. The land and construction required might affect only a small part of the greenway.

Land Use Regulation

There are many regulatory tools available to local and senior governments to assist in implementing stewardship. See *Stream Stewardship: A Guide for Planners and Developers* for an introduction to these tools.

Greenway Planning

Detail Design

Maximizing greenway benefits by careful design

Completing a greenway strategic plan is a major first step for implementing greenways. The plan will have answered many, but not all questions about the greenway. For the natural areas of a greenway, minimal additional planning may be required beyond securing conservation status and preparing a management plan. However, for greenway projects that involve construction, a critical step between planning and implementation is the detail design of proposed improvements. Many problems can be minimized by good design and by quality control during construction.

Detail Design

Each greenway improvement project must be the subject of detail design prior to construction. This will be true whether the project is to be built by agency staff, contractors or volunteers. To make certain that the design is safe, appropriate, maintainable and practical, the design work should be completed by a registered profession, and financed as a public investment.

Construction Management

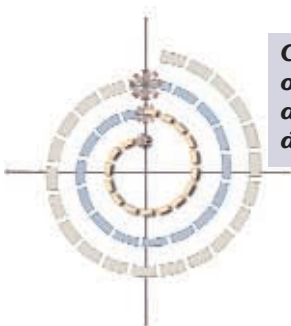
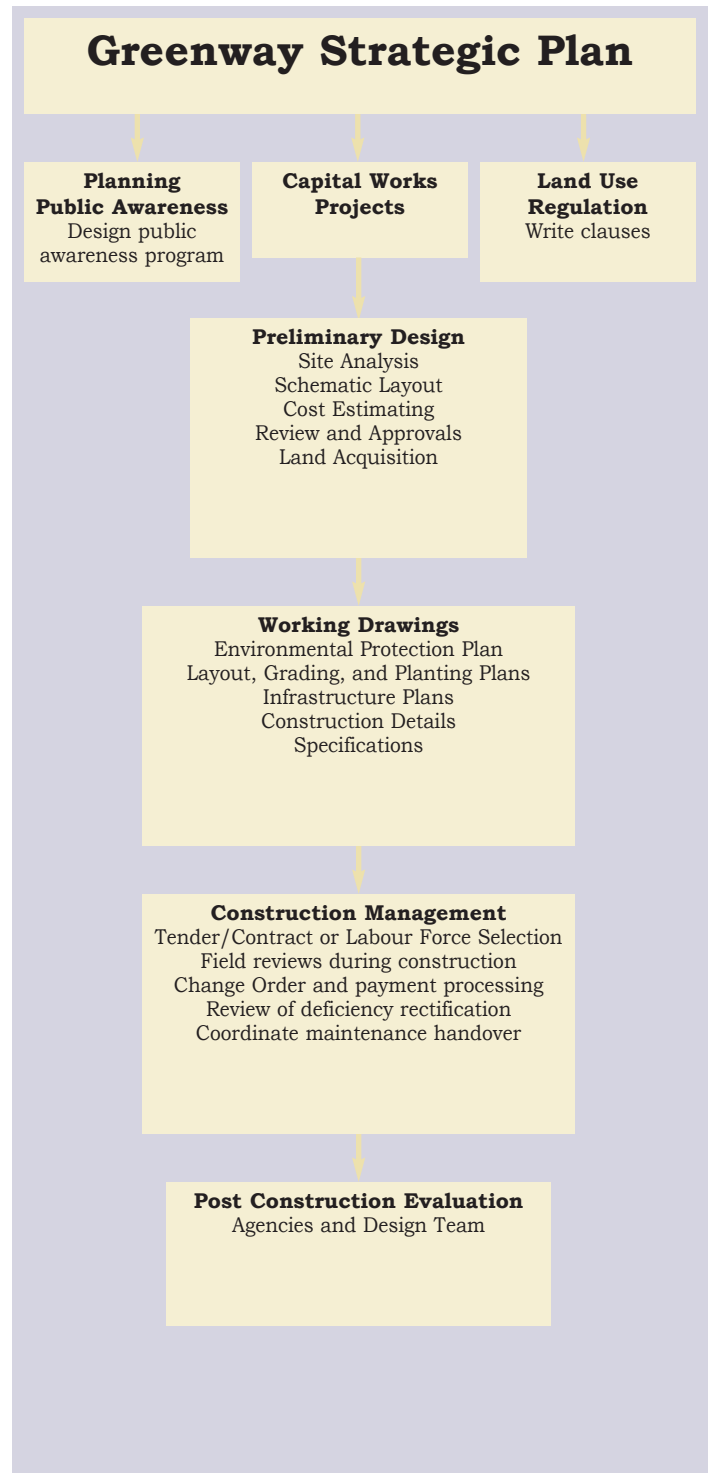
No matter how carefully planning and design work is prepared, the success of greenways depends upon how well the sites are built and maintained. Quality control during construction is of critical importance.

Many greenway projects will be located adjacent to fragile natural systems. Standard construction practices will need to be modified and carefully enforced to ensure that no damage is done to natural systems.

Use of bonding, professional supervision and environmental monitors during construction is recommended. To ensure quality control, we suggest that volunteer groups wishing to be involved in construction sign a formal contracting agreement with the greenway manager.

Maintenance

Maintenance specifications will be required to ensure that greenway objectives are understood and respected by maintenance personnel. These specifications should include schedules for maintenance practices, and special requirements to ensure that maintenance practices are compatible with the natural systems surrounding greenway projects. The natural components of greenways will require only minimal maintenance. Just as best practical technologies for construction projects are evolving, maintenance practices for greenway areas will also need to evolve as our knowledge of environmental management increases.



Complete all four steps - inventory, objectives, alternatives, decisions - at a very fine level of detail at the design stage.



Greenway Implementation

Included in this section:

4 Land Tenure Alternatives

Reviewing strategies for land ownership in a greenway system.

4 Land Use Regulations

Introducing regulatory approaches to promoting stewardship.

4 Ideas for Greenway Interfaces

with Urban Development

with Recreation Development

with Linear Development

with Rural Residential Development

with Agriculture

with Forest Lands

with Floodplains

with Integrated Watershed Management

Community GreenWays

Greenway Implementation

Land Tenure Alternatives

Building a greenway system through land ownership alternatives

To create a greenway network which links green space remnants in various parts of a community, look for cost effective alternatives, including a mix of fee simple land ownership and more innovative land tenure. Many options for ownership and management exist which may be combined or tailored to suit specific requirements.

Public Greenways

The options identified in the chart on the facing page may be used separately or in combination to achieve an appropriate blend of land use and cost.



The Greenfields Project shares the cost of cover crops with farmers for soil conservation and wildlife habitat.

Private Greenways

Private stewardship is an essential part of an effective greenway program. Adjacent land owners should be consulted as part of the greenway planning process.

Landowner Contact

Identify and provide detailed information for adjacent landowners about the progress of the greenway program.

- n Provide information about overall greenway objectives.

- n Encourage input into the greenway planning process.

Programs for Private Stewardship

Support voluntary activities which minimize impacts on environmentally sensitive areas.

- n Streamkeepers programs.

- n Naturescape British Columbia, caring for wildlife habitat at home.

- n Environmental programs through schools.

- n Local Community Program e.g. Greenfields Project.

Funding for Private Stewardship

- n Develop alternative funding sources for stewardship programs.

- n Service clubs can support stewardship activities through direct funding and community interaction.

- n Develop business sponsorships.

Land Purchases

Includes land acquired for public uses such as parks, open spaces, and owned fee simple by government. Such lands may be acquired through direct purchase or from 5% parks and 5% schools dedication provided during subdivision.

Gifts, Donations, and Exchanges

Local governments have many options for land acquisition beyond direct purchase.

Conservation Covenants

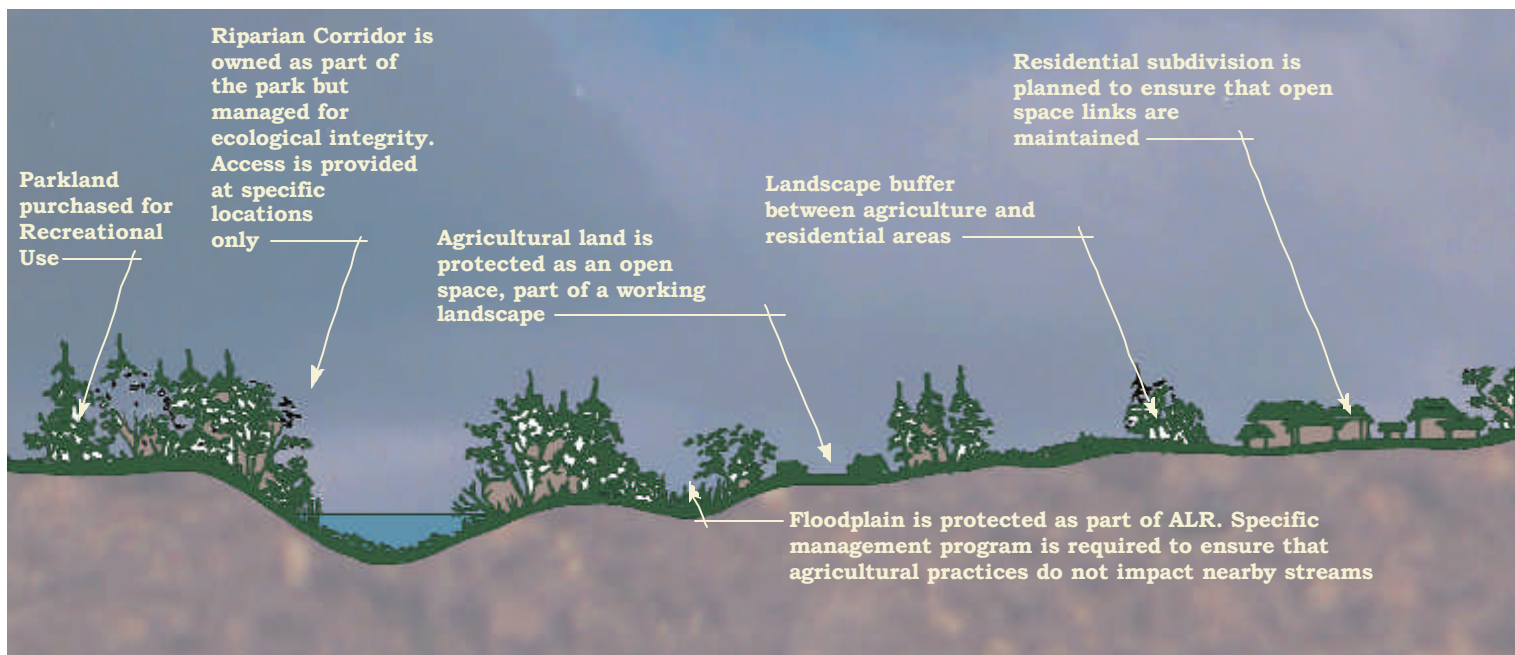
can be registered against a land title and held by governments or registered conservation organizations.

Easements

Can be negotiated with land owners to ensure access for maintenance or recreation purposes.

Leases and Contract Agreements

Agreements can be negotiated with landowners to provide for a variety of activities on private land.



Purpose

- Provides direct control over land use.
- Suitable where greenway uses are the primary function of the land.
- May be required where environmental regulations effect land such that no economic use is possible.

- All of these options provide control of land without direct capital expenditure
- Donations of land for environmental conservation are encouraged by recent amendments to the Income Tax Act allowing deductions based on the value of donated land.

- Conservation covenants can be provided to allow registered conservation organizations to manage land to preserve environmental heritage for all Canadians.
- Easements can be obtained, with the owner's permission, to provide recreational or maintenance access.

- Can be negotiated for specific conditions.
- The terms and length of these contracts can be varied to suit conditions.

Cost

- Purchase may be too expensive where land is required in urban areas.
- Where greenways are established in undeveloped areas land acquisition may provide maximum flexibility for future development with a minimum investment.

- Capital costs for acquisition are eliminated.

- Capital costs for acquisition are reduced or eliminated.
- Where local government cannot manage environmental assets, consider a covenant to a registered conservation organization.

- Capital costs for acquisition are reduced.
- Terms of agreement can be negotiated to match local government budgets.

Tenure

- Direct purchase provides long term stability for planning because ownership of all land rights is secure.

- Tenure is secure if local governments hold title.
- Provides long term stability for planning because ownership of all land rights is secure.

- Tenure via the covenant is held by either a level of government or a conservation organization.
- For enforcement of covenant terms, a conservation organization may be a more effective covenant holder.

- Security of arrangement is related to the terms of the contract or lease.
- Contractual arrangements may be affected by sale or transfer of property.

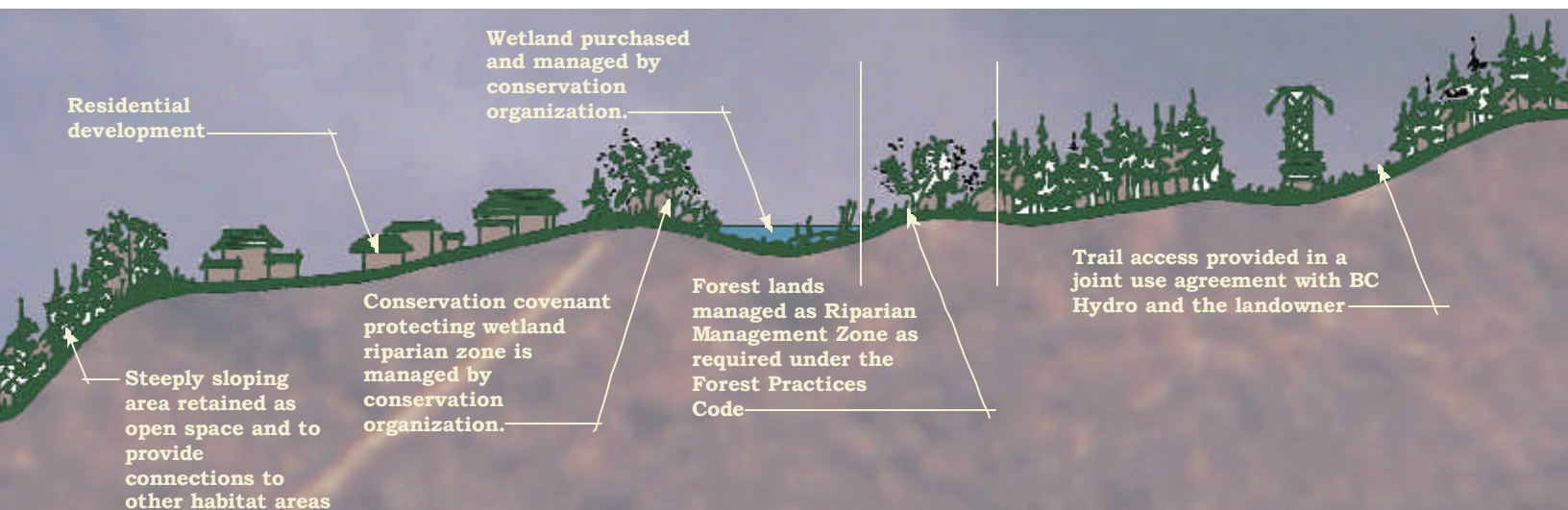
Responsibility

- All issues of maintenance and liability will reside with the local government where land is purchased for greenways.
- In addition to acquisition costs local governments must plan for maintenance and administration.

- All issues of maintenance and liability will reside with the local government where land is owned for greenways.

- In covenanted areas, all issues of maintenance and liability will reside with the underlying owner, Special agreements may be necessary for public access.
- Maintenance responsibility can be transferred to the conservation organization.

- Can be varied by the terms of the agreement.
- Leased land can be maintained by the local government or by the owner.



Greenway Implementation

Land Use Regulations

Streamlining approvals and enforcement of laws affecting land use

Greenway planning is a process which can help to coordinate environmental land use regulations. By integrating environmental regulations required by all levels of government, greenways can help to move closer to a one window approval for environmental concerns.

Green Space & the Law

Major Acts and Land Use Regulations which apply to greenways and their interface with environmentally sensitive areas include:

Federal

Fisheries Act
Migratory Birds Convention Act
Navigable Waters Protection Act

Provincial

Forest Practices Code Act
Forest Land Reserve Act
Agricultural Land Reserve Act
Municipal Act
Growth Strategies Act
Land Titles Act
Health Act
Water Act
Environmental Assessment Act
Soil Conservation Act
Wildlife Act
Fisheries (B.C.) Act
Highways Act
Heritage Conservation Act
Waste Management Act

Local Government

Official Community Plans
Development Permits
Zoning Bylaws
Subdivision Bylaws
Building Bylaws
Engineering Standards
Works and Services Bylaws
Development Cost Charge Bylaws
Tree Protection Bylaws
Environmental Bylaws

Integrated Regulations

One of the major benefits of Greenway Programs is the focus of regulatory powers on a coordinated action plan.

Greenway planning cannot ignore the jurisdictional lines set out in law. But the establishment of a Greenway Alliance can work towards identifying inconsistencies in regulations and practices of enforcement, and can strike an agreement among governments on how to manage around the inconsistencies.

A careful review of regulations, policies and procedures of all parties in a Greenway Alliance can result in approaches which streamline administration of law for both the administrators and the applicants.

Integrated Local Government Bylaws

Villages, Towns, Cities and Regional Districts as local government are bound by senior government statutes. Local governments, however, have the most discretion and management control about the scope and content of land use regulation bylaws, and are closest to the people and the problems. The Stewardship Series of publications lays out ways that local government bylaws can be written to complement the powers of senior governments. For example, the Fisheries Act (Canada) prohibits the harmful alteration of fish habitat, which includes riparian zones. This act is only enforceable by court charges after damage is done. Local governments have the power to enact tree protection or permit bylaws which restrict the removal of trees from riparian zones, and to enforce these bylaws by ticketing. Together, the two levels of government can buttress each other's regulations for protecting riparian zones.

Memoranda of Understanding

To be effective in the above example, enforcement is key. Enforcement is often limited by staff time available, and the costs of court enforcement. Local and senior governments can draft Memoranda of Understanding to structure their responses to enforcement. For example, such an MOU might strike an agreement whereby local governments will regulate tree protection in riparian zones under a bylaw. The parties may agree that the local government will issue tickets for minor infractions under its bylaw, and inform the senior government of the tickets issued. The senior government may lay charges for major infractions under the *Fisheries Act* or other senior government statutes, but will not act on minor offences. Both parties could agree on what constitutes a major and a minor offence.

Law Reform

In some cases, during the drafting of an MOU, levels of government will find that there is a legislated impediment to a better way of doing business. The Greenway Alliance should have the ability to record those problems, and notify the policy making level of the appropriate agency, so that a process of review and reform can be considered.

Greenway Alliance

A Greenway Alliance can be created as an interdisciplinary coordinating body to oversee regulations affecting lands managed within a Greenway. This alliance will include members of interested parties and will be responsible for coordinating policy and regulation issues.



Streamlining environmental regulations, to be fair, efficient and easy to administer, is one of the most important objectives of greenway planning. Changes made within the greenway can serve as a model for environmental regulations beyond the greenway as well.

Cutting Red Tape with Greenway Programs

The following are some of the major obstacles to streamlining the administration of government.

- Overlapping jurisdictions.
- Fragmented bureaucracies.
- Incompatible or opposing policies.

Greenway Planning provides a vehicle to resolve these difficulties in administration.

- n** Establish a Greenway Alliance for open communications among agencies.
- n** Review administration of existing laws, determine inconsistencies.
- n** Change existing bylaws to eliminate inconsistency or improve efficiency.
- n** Enact new bylaws only when specific gaps are identified. Use voluntary measures, or private agreements whenever possible.
- n** Establish Memoranda of Understanding among agencies to reduce overlapping effort, and encourage complementary effort. Include 'filters' to screen referrals, and a dispute resolution mechanism.
- n** Set up a 'one-window' approach to Greenway questions and approvals.

Signs of Cooperation - Joint Guidelines

Federal and provincial government agencies are working together to be more effective at less cost.

Local governments and non-government organizations are also being encouraged to join the initiatives.

The **Stewardship Series** of publications, including: *Stream Stewardship: A Guide for Planners and Developers* and *Community Stewardship: A Guide To Establishing Your Own Group* are just some of the products of this cooperative effort. A more detailed listing of these resources is provided on page 72. Please refer to these publications for additional information.

Related to these publications are efforts at designing a new way of doing business among governments, NGOs, corporations and the public. Greenways is one of these new approaches.



Naturescape documents, a part of the Stewardship Series, describe ways to provide wildlife habitat in your own back yard.



Local governments have effective tools for regulating environmental issues at a local scale.

The Role for Local Government

While there is a great deal of existing environmental regulation, there is still an important role in greenway planning for local governments!

- n** The federal government targets on issues of national or international significance.
- n** The provincial government is focussed on issues of provincial significance.
- n** Given these priorities, ecological and open space issues can often only be addressed at a local scale by local governments.
- n** Local governments have control over zoning and most land development. It is land development that has the primary impact on ecosystems in urbanizing communities.
- n** Local governments, using a combination of 'ticketing' and 'permitting' can deal efficiently with minor infractions.
- n** Major expenditure involving more complex legal remedies can be reserved for major infractions.

Greenway Interfaces

Urban Development

Maximizing effectiveness of green space in urban areas

Greenways improve the livability of urban areas. An urban greenway, because of land use intensity and the cost of land acquisition, is likely to be very different from a greenway in a rural area.

Within urban areas, different types of greenway will be feasible depending on the land use context.

In **older redeveloping urban areas**, typified by existing small lot sizes (up to 2 Ha), high density zoning and high land values:

n New greenways in existing high density areas will need to maximize benefits to justify the expense. New greenways will be smaller, included only where key linkages are worthy of protection, and will require a high standard of design and maintenance.

n Location of greenways will be balanced with land development planning, so that both the development and the greenway may be located to optimize economic and environmental benefits.

n Many public access linkages within highly urban settings will use the street system, malls and plazas, or combine with other utility or transportation rights of way to make connections.

In **developing urban areas**, typified by existing moderate sized lots (2 Ha to 10 Ha), with little previous development, and single family or low density multiple family zoning and moderate land values:

n Design and management of greenways should provide a marketing advantage to the development - e.g., by addressing aesthetic and privacy considerations.

n New greenways will typically be limited to riparian areas of watercourses or other high value environmental feature, combined with key trail linkages.

n Some flexibility in riparian leave strips should be accommodated, based on site specific biophysical conditions. Fish habitat should always be conserved, but if some flexibility in leave area boundaries accommodates significantly greater development yield with little effect on fish habitat, it should be considered. Provision of detailed biophysical data paid for by the developer could provide a basis for discussion of a reasonable compromise and expedite the approval process.

n Some flexibility in zoning requirements should also be considered in cases where the proposed greenway or leave area is a significant part of the development.

n Care in design of greenways will be necessary to ensure that use of small existing lots is not prohibited. In some cases purchase of small lots for greenways, or other compensation, will be the fairest option.



Vegetable plots, shown here in the Arbutus ROW in Vancouver, provide ecological links between Greenways and people

In **new comprehensive development areas**, typified by existing large sized or assembled lots (over 10 Ha) on land with limited previous development, under extensive planned rezoning and low to moderate existing land values:

n Options for the size and location for greenways will be greater.

n Limitations on greenways provided without public subsidy will be the number of units and market price for the development. The more land and improvements are dedicated, the higher the likely costs and sale price of the development. There must be a viable market for the higher priced units to support the creation of the greenway by the developer. If the market will not bear the cost, the greenway will require public investment to become reality.

It is clear that greater opportunities for greenway implementation exist in rural areas, or larger comprehensive developments, than in older redeveloping urban areas. In some cases, public demand may warrant production of extensive greenways as a part of urban redevelopment, and these would typically be funded by public expenditure or voluntarily as a part of a major private redevelopment scheme.

Compact Communities

The negative impact of low density, sprawling suburban development on natural systems can be dramatic, through:

n Large per capita land requirements.

n Increased use of cars, with resulting reduced air quality and increased energy use.

n Incremental habitat loss due to fragmentation of habitat areas.

Compact, higher density urban development also has impacts, but they are relatively less on a per unit basis.

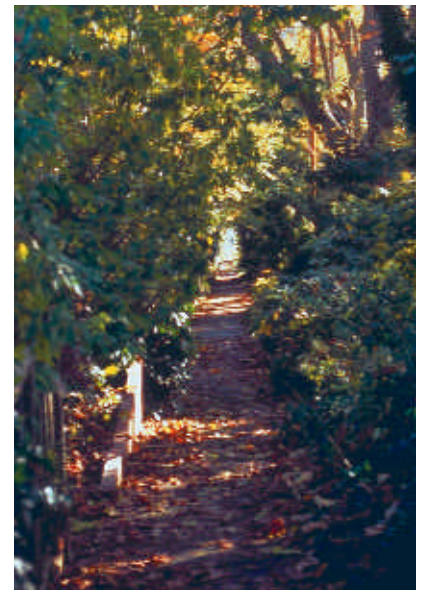
The urban village concept, with smaller centres of mixed use:

n Encourages walking, cycling and transit use.

n Brings back the charm of pedestrian oriented spaces.

n Reduces servicing costs per unit.

The urban village concept, and greenways, are complementary ingredients in the development of more compact and sustainable communities. A blend of densities - high rise to single family - is appropriate in compact communities. Increased density can be more acceptable in communities that develop greenways.



Greenway trails can exist even in very small spaces.

Tools for Conserving Scarce Habitat in Urban Areas

Strategies for conserving scarce urban habitat include:

Direct Purchase

by:

n advance purchase, prior to granting higher zoning, to keep land acquisition costs as low as possible;

n negotiation of purchase at time of subdivision, by creating a lot for a greenway in a desired configuration;

n land assembly of several parcels, with subsequent reparceling, rezoning and resale of the development parcels, with the greenway retained in public ownership;

n purchase and improvements funded by Development Cost Charges for open space, provided that these charges are affordable.

Incentives and Tax Relief

by:

n Official Community Plans which establish policies and outline expectations for community development.

n Density Bonus zones which allow greater density in exchange for dedication or improvement of a Greenway.

n Comprehensive Development zones which allow the negotiation of a customized zoning bylaw for a site, and can include the creation of a greenway.

n Income tax relief equivalent to 50 cents per dollar for the value of

donated lands which are environmentally sensitive.

n Property tax relief, either by changing the assessment category of covenanted lands, or by direct relief from local governments.

Regulatory Requirements

by:

n Development Permits for protection of the natural environment, which require that all natural watercourses be conserved and dedicated;

n Dedication at subdivision of 5% of the parcel for parks and 5% for schools, or cash in lieu;

n Tree Management or Tree Cutting Permit Bylaws to regulate tree cutting;

n Soil Removal and Deposition Bylaws to regulate the movement of soil, which can address erosion and sedimentation concerns;

n Other Environmental Bylaws e.g. creek protection bylaws, drainage bylaws, water quality bylaws, comprehensive equivalents combining the above, and provisions of engineering standards.

n Regulatory enforcement measures, coordinated among levels of government.

For More Detailed Information:

See *Stream Stewardship: A Guide for Planners and Developers*, one of the Stewardship Series publications.

Stormwater Management Functions in Greenways

Keeping streams alive means controlling the quantity and quality of water that reaches the stream. Stormwater management functions can be complementary to a greenway in urban areas.

n Natural open spaces will allow precipitation to infiltrate reducing the amount of water entering streams after storms.

n Constructed wetlands built to manage rainwater can also provide an amenity for urban wildlife, nature lovers, and increased water quality.

n Detention ponds can be public open space amenities in the greenway, if properly designed and maintained.

n Many communities have an open streams policy, and some have replaced sections of storm sewer with recreated open streams.

n Floodplain areas can function as both passive green space and flood storage;

n Existing dykes provide trail linkages;

n Many communities in North America have removed development from floodplains where structural flood protection was uneconomic or environmentally undesirable, and have turned a problem into a greenway amenity.



In this habitat restoration project, root wads and rocks have been placed to simulate natural conditions. In this way, it is hoped that fish may be able to re-use the stream.

Restoring Habitats

In many cases, streams may have been piped, or riparian habitats may have been altered by suburban residential, agriculture or other uses.

Greenway programs should identify where habitats could be restored. For example, the lower reaches of a valuable stream may have lost riparian vegetation, or may be encroached upon by landfill. Greenway strategies should consider what actions could be taken to restore some habitat function to these sites. Densification of adjacent development sometimes provides opportunities. In other cases, government or volunteer restoration and planting programs can make a difference.



In Courtenay, an out of use sewage lagoon is rehabilitated to create fish and waterfowl habitat.

Greenway Interfaces

Recreation Development

Design greenways carefully to find balance between recreation and conservation.

Open space included in a greenway is protected from development as roads and buildings. In spite of this general protection however, there are still threats to environmentally sensitive areas. The recreational uses of a greenway must be designed, managed, and maintained to ensure that ecological viability is not diminished.

A Problem of Overuse

People love open space. Frequently, however, people aren't aware of how their use of open space can diminish natural assets.

Habitat can simply be over-run by too many feet. Soil compacts, vegetation dies, erosion begins, and ultimately birds and wildlife must move away or perish.

Nesting, breeding and rearing sites for young wildlife are particularly vulnerable to human disturbance.



Open space can be used by everyone.



This boardwalk allows people to use the waterfront without causing erosion or compaction.

Designed Use

Greenways should be planned to allow adequate space to separate intensive recreation uses from critical habitat areas. In practice, there will be gradations of use, from areas which are so sensitive that human use must be restricted, to areas where intensive human use has little adverse impact.

At a minimum, detailed greenway plans should map proposed use classes, e.g.:

n Trail area

n Trail buffer

n Natural Areas for conservation

n Intensive Recreation Area

Trail alignments and recreation areas should be located so as not to compromise important habitat.

Approaches to achieve this include:

n Providing extra width in the greenway to accommodate a trail.

n Providing a barrier between the trail and the habitat.

n Considering alternate trail alignments outside of the greenway and away from sensitive habitat where space is limited.

n Consider the impacts of different use groups on conservation areas, e.g. motorized or equestrian trails near sensitive habitat.

To manage recreation uses, consider:

n Posted or published trail use rules.

n Involving a conservation organization to provide vol-

Designed Facilities

Trail location design should consider:

n setbacks from conservation areas. Generally, trail alignments should stay as far away from protected habitats as possible while meeting recreation objectives.

n shortcuts - people will always walk the shortest possible distance. Trail systems should be aware of and respond to these desire lines.

n trail viewpoints and rest areas should be located where their negative impacts are minimized.

n trail information should be provided, clearly indicating reasons for restricted access to habitat.

n trail design and surfacing can play a role - people will avoid muddy surfaces and seek paved ones.

n maintenance access is often a consideration. Usually this can be combined with major pedestrian trails or bicycle access.

n where trail alignment and design cannot avoid crowding habitat, then barriers must be designed.

n physical barriers can include fences, hedges, thickets, steep slopes, walls, handrails, water, mud.

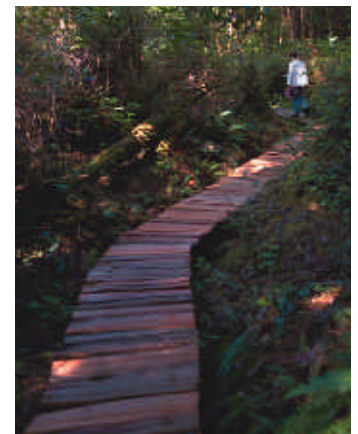
n mental barriers can include signs, obvious private land, tickets for offending persons, and lack of night lighting - most people will not go into the woods in the dark.

n trail management should recognize seasonal variations in habitat e.g. some trail sections could be closed or restricted for waterfowl nesting season. Some trails also may be designed to flood if in floodplains or foreshore areas.

n trail erosion control is important. Control the flow of water along the trail with interceptor drains, drain inlets, water bars, or shoulder planting.

n where damage has occurred, revegetation should be undertaken quickly. Native species with habitat values should be given thoughtful consideration.

n greenways should promote a new aesthetic of low maintenance - where mown lawns are reserved for areas of intensive recreation, and meadow, woods or other more natural habitat type is planned throughout most of the greenway.



Fragile ecological resources may require careful protection from overuse.

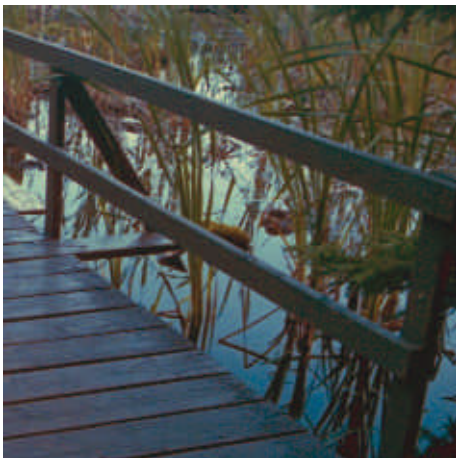
Public Ways and Private Wishes

Trail location must consider not only wildlife habitat, but also the needs of working landscapes like agriculture, and privacy of adjacent residents. Residents also worry about security - this is addressed on Page 65.

Where greenways were not planned in advance, widths are commonly too narrow to comfortably allow habitat conservation and trail access without crowding adjacent residents or agriculture. Proactive greenway planning should avoid this problem by:

n Planning for an adequate width of the greenway at the time of setting boundaries, with conflicts between trails, neighbours and habitat in mind.

n Making clear decisions on which parts of the greenway should accommodate a trail. Not all sections of the greenway must have a trail. Other sections of constraint can be bypassed with public access by using a street system or alternative service corridor route.



Through careful design recreational activities can occur without diminishing the ecological value of the resource.



Design treatments to avoid privacy conflicts include:

Trail Alignment - Horizontal

n Locate the trail in an area which is screened from both adjacent residences and habitat areas.

n Consider the screening capability of the vegetation - widen buffers in areas of low screening.

n Consider the type of adjacent land use - single family sites with children will be more sensitive to disturbance than areas of older residents or multiple family dwellings.

n Consider trail use - low volume trails will be more acceptable than major routes.

n In many open space subdivisions, the house is moved very close to the street, creating a more urban street, and semi-private space overlooking a greenway is created in the rear.

Trail Alignment - Vertical

n Provide grade separation, with the resident above, overlooking the trail where possible.

Financing Greenway Recreation

Sources of funds for constructing Greenway Trails systems include:

n the 5% parks dedication at the time of subdivision.

n Development Cost Charges for Open Space, to purchase land and for facility development.

n Provincial cost sharing programs like BC21, or the Urban Salmon Habitat Program may help.

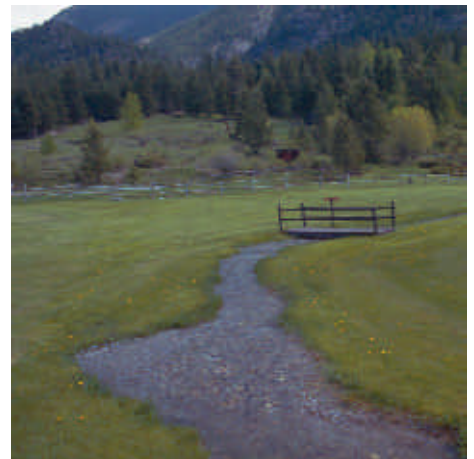
n Retraining and college programs are often targeted at developing basic construction or environmental restoration skills. Greenways are a prime candidates for training.

n Volunteer efforts by local NGOs and service clubs can be very effective.

n Direct local government investment is also usually required.



In areas of heavy use trail surfaces must be upgraded and maintained to minimize erosion.



Maintenance practices should be modified to ensure that riparian habitat is retained along watercourses.



Public education is an important aspect of establishing a workable balance between ecological and recreational objectives.

Greenway Interfaces

Linear Development

Using existing corridors to create linkages in a Greenway System

In urbanizing areas, a primary function of greenways will be to re-establish linkages between open space fragments. In support of this goal, linear systems provide great opportunity as part of a greenway system. Jurisdictional corridors such as sewer or hydro rights of way, or physical corridors such as rail and highways can all be managed to advance greenway objectives.

Habitat Corridors

Linear developments can be an important component of greenways, by providing connections between fragmented habitats. Linking individual habitats together creates an overall system. Providing habitat linkages allows:

- n Seasonal movement between habitat areas.
- n Greater aggregate habitat area.
- n Access to hinterlands where habitat is not restricted by development.
- n Genetic diversity as populations move and mix between habitat areas.

Opposing the benefits of incorporating linear systems into greenways, there are a number of offsetting difficulties which can be created by linear developments.

- n Providing access to native habitat areas for exotic species which may exist within urban areas opens the potential for competition which may be harmful to natural species.
- n Some poorly designed linear developments cut across desired Greenway connections and therefore limit opportunities for open space continuity.
- n Linear open space systems are difficult to maintain in their natural condition because of the predominant influence of external forces.

Recreation Corridors

Recreation corridors are another greenway function. Linear developments which already exist within urban areas provide many opportunities for greenway development by:

- n Providing recreational access alternatives, such as hiking or cycling, which do not adversely impact the habitat functions of riparian corridors.
- n Allowing joint use of corridors creating opportunities for cost efficient management.
- n Creating direct access for pedestrians and other recreational users.



Transportation corridors established for cars and rapid transit may also be designed and managed to encourage pedestrian and bicycle circulation.



Wildlife corridors, like the stream riparian vegetation shown in this photograph, can provide important habitat connections. Connecting remnant vegetation blocks together helps to create more sustainable habitat.

Innovative Connections

As part of the greenway planning process, all opportunities for linkages should be reviewed. To explore these options:

- n Map existing linear development such as transportation corridors, rights of way, and utility corridors.
 - n Look for connections using these corridors between major greenway elements.
 - n Consider the greenway function of the linkage - is the corridor to be used for recreation, as a habitat corridor, or both?
 - n Identify appropriate agencies - look for contact people and begin to develop multiple use strategies.
 - n Recognize that in many situations, the opportunity for greenway connections may not have been previously recognized.
- Opportunities will become apparent as part of this planning process. Depending upon the agency, different opportunities for cooperation between greenway and existing management objectives will be available.
- n Some agencies, such as the Ministry of Transportation and Highways, have a direct mandate to provide for alternative transportation corridors, including pedestrian and bikeway linkages.
 - n Other groups such as BC Hydro have no direct mandate but are committed to considering management structures which allow multiple uses.

Cooperative Management

Multiple use agreements are, by their nature, more complex to administer. In order to persuade agencies of the value of such agreements, greenway organizers must be prepared to communicate the merits of the overall greenway system. A greenway is valuable because of the connections it creates. By illustrating for agencies how a corridor, or right of way, can complete a greenway system, organizers can show how a relatively minor commitment can be leveraged to create a more comprehensive green space system.

n Identifying opportunity by itself is often not enough to create the support for a joint use agreement. Greenway planners must be realistic about the increased costs of multiple use, and be prepared to justify increased management costs.

n Identify public relations benefits available from scenic or recreation amenities provided.

n Identify public relations benefits through substantial contributions to environmental stewardship.

n Suggest cost savings arising from alternative maintenance practices. Inclusion within a habitat area may provide direction for less intrusive maintenance practices.

n Consider transfer of some maintenance functions to a Greenway management organization.

n Pay the costs of creating the joint use agreement.

n Cost share increased management costs.

Formal Agreements

Where joint use of corridors are to be undertaken, a formal recognition of land use should be established. Several options exist which can be applied to meet a range of circumstances.

n A covenant can be registered on the land title which recognizes the secondary use.

n Where a covenant is not appropriate, the terms of the agreement can be laid out in a written contract.

n Where a large number of parties are involved, a Memorandum of Understanding can be prepared.

Innovative Partnerships

Ministry of Transportation and Highways

The Ministry of Transportation and Highways has a number of policy objectives which are compatible with greenways.

Highway Environment Branch

The Roadside Development Section develops policies and programs affecting the landscape development and maintenance of highway road-sides.

Ongoing vegetation management planning takes into consideration aesthetics and plant ecology, such as wildflower programs, native plant regeneration, and streambank erosion control.

A scenic highway program is under development and greenway planners should consider integration of scenic highway routes with local and regional greenway implementation plans.

Bicycle Connections

n Bicycle routes in greenways should include linkages to roadway bicycle routes.

n Consider possibilities for joint construction and bikeway maintenance programs within highway rights of way.

Highway Safety Rest Areas

n Coordinate recreation walkways with highway safety rest areas as pathway starting and ending points.

n Use safety rest area interpretive sign programs to describe greenway programs to visiting and local travellers.

BC Hydro

BC Hydro recognizes the need and benefits of multiple use agreements for their transmission corridors and have published guidelines for secondary use applications.

BC Hydro owns very little of the land on which transmission corridors are built. Discussion about joint use agreements must also include the landowner and other parties with interests registered on title.

BC Hydro reviews applications on an individual basis, approving applications which:

n Are safe.

n Respect the security of hydro works, property rights, and hydro's ability to serve customers.

n Will not compromise hydro's future requirements for additions, modifications, and maintenance of the electrical transmission system.



Photo Credit: Joan Masber

Recreation and conservation needs can be coordinated within utility rights of way.

Underground Pipelines

Transmission corridors and land holdings for pipelines could be treated in a similar way to hydro corridors.

Active Rail Corridors

Rail lines are usually developed within 100 ft. rights of way on land owned by the rail companies. Agreements for recreational access are considered on these corridors provided that they do not interfere with rail operations, and are safe.

Typically recreational pathways are considered where:

n Pathways can be located at the edge of the right of way, 40 to 50 ft. from the track.

n A physical separation, fence or barrier, between pedestrians and rail traffic can be provided.

Joint use is allowed in the form of a contractual agreement, but access covenants registered against the land title are not allowed.

Inactive Rail Corridors

In many situations around British Columbia, rail lines have been abandoned. These abandoned rail corridors provide ideal opportunities for rail to trail conversions.

Municipal Corridors

Many options exist for cooperation within local government departments.

n Initiate discussions with engineering departments about joint use of sewer rights of way.

n Encourage revision of street standards for special circumstances where environmental values are high.

n Encourage multiple use of stormwater management areas for habitat in the form of constructed wetlands.

Greenway Interfaces

Rural Residential

Maintaining a rural character at the fringes of urban areas

Rural residential development, because of its low density, frequently has impacts for natural systems far out of proportion to the numbers of people or investment involved. Using the ideas for protection of natural areas as illustrated, as much as 50% of open space can be protected forever without diminishing development rights and opportunities.

The Problem of Incremental Loss

Typically in rural British Columbia, subdivision bylaws require that residential lots be a minimum of 2 hectares in area. This limit is set to ensure very low density.

As subdivision occurs over time, more and more land is transformed into 2 hectare residential lots. As this happens, rural agricultural or forested areas are transformed to residential areas at this very low density. The impact of this gradual change is to fragment natural areas so that ecosystems can no longer function properly. Fish and wildlife habitat is lost, and the natural character of the landscape is diminished. For people living in these areas, the loss of natural character is frustrating - for many, being close to nature was the attraction of the rural lifestyle in the first place.

Rural by Design

In his books, *Rural by Design* and *Open Space Subdivision*, Randall Arendt illustrates the potential to change local government bylaws to encourage a much more 'rural' design character.

His open space subdivision ordinance mandates that basic environmental qualities are considered in low density subdivisions.

For example, where lots may have been 2 hectare minimum, open space subdivisions may average the density to create clusters of homes on 1 hectare lots, with the balance of the site in open space. This approach allows up to 50% of the site to be maintained as natural open space which can be jointly held, and legally protected.



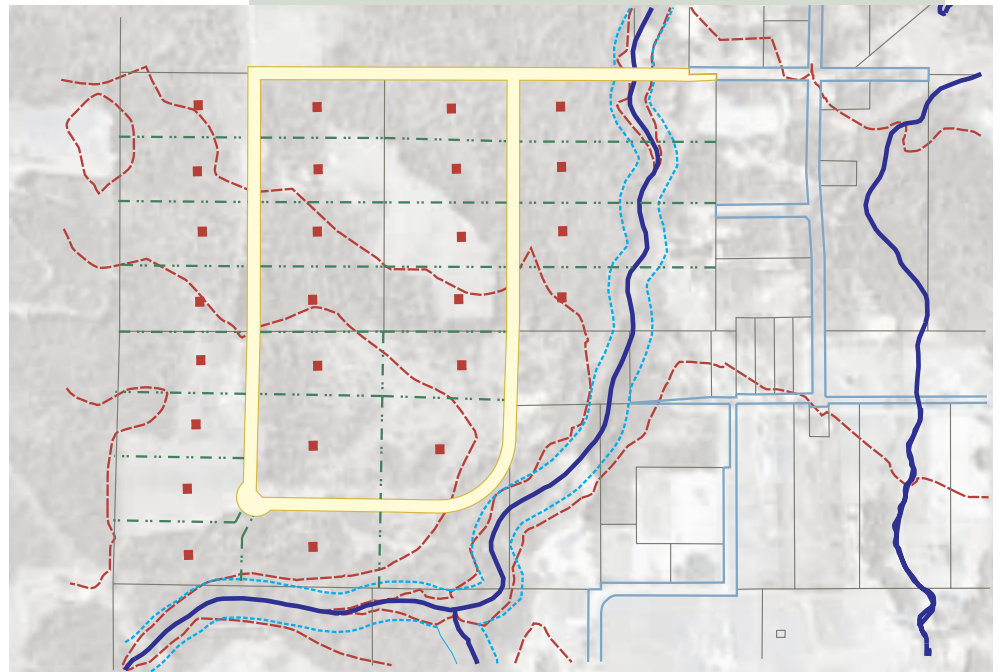
Rural residential subdivision fragments natural open space and causes great damage to natural systems

'let us build many more "golf course developments", but for the most part without the golf courses themselves - substituting community greens for putting greens and greenways for Fairways.'

Randall Arendt
Designing Open Space Subdivisions

Open Space Subdivision

The following example illustrates a typical development scenario for rural residential land. The properties are located adjacent to an urban centre but are beyond the city's limits. The land is zoned for rural uses and much of the surrounding land is within the ALR. The traditional subdivision maximizes yield using the minimum lot area of 2 hectares. In the Open Space subdivision plan, the overall density is maintained, but lot size is reduced to 1 hectare. The result of this process is that all of the environmentally sensitive lands are maintained in their natural state without further possibility of subdivision.



Encouraging Open Space Design

In British Columbia, creating rural by design can be encouraged by refinements to rural zoning.

- add a density bonus arrangement to the zoning category. This would identify the increased density that would be allowed on part of the property in exchange for conservation of the remainder of the property in open space as an amenity.
- stipulate in the density bonus wording how much of the land should be dedicated to public ownership, and how much could remain private 'in common' ownership by the residents purchasing the development.

■ mandate an environmental design approach in the density bonus, requiring a basic inventory of environmental resources as a basis for subdivision planning.

■ check with Ministry of Health on sewage considerations. Soil conditions will need to be suitable. Note, however, that the open space subdivision approach will provide abundant choice for septic disposal sites.

■ require a conservation covenant on the open space area. Consider using an NGO to hold the covenant.

■ consider bare land strata arrangements for the land.

■ alternatively, use a homeowner association or a contract approach, using a corporation to hold the land for the residents.

Naturescape

Open Space Subdivisions provide an ideal vehicle for strata corporations to get involved with Naturescape approaches.

Naturescape British Columbia is a new province wide initiative which encourages homeowners to care for wildlife habitat on their property. Detailed information on how to maintain private property for wildlife is available for:

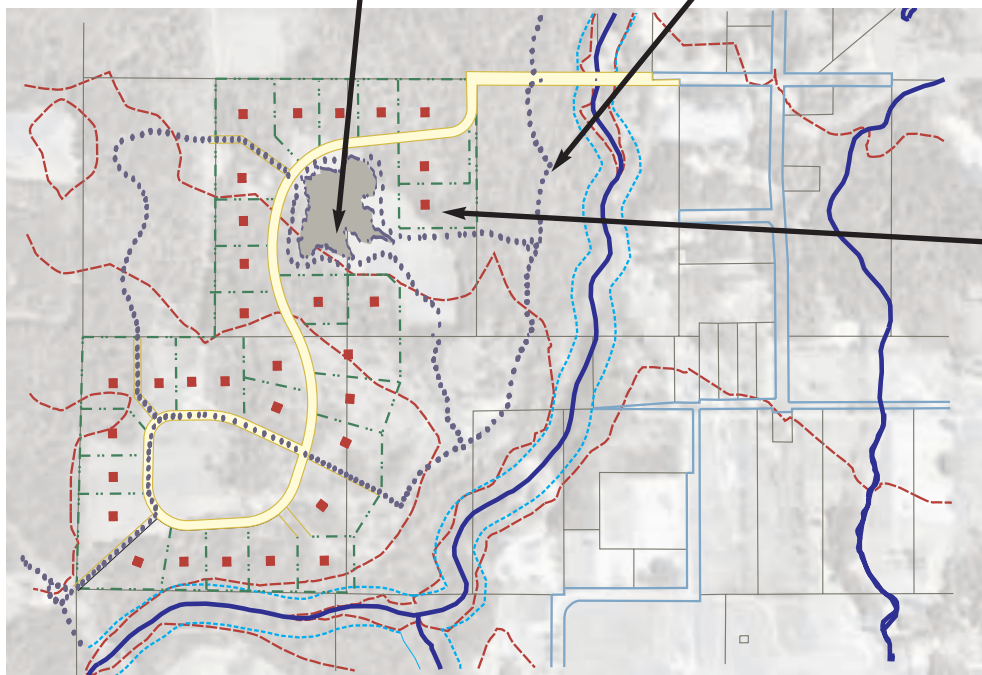
- conservation of existing habitats.
- restoration or recreation of new habitats.
- provision of watering facilities for wildlife.
- feeding stations for wildlife.
- control of pets, who act as predators.

See *Naturescape B.C.*, a publication in the Stewardship Series for more information.

Pre-development stormwater flows are maintained by providing stormwater retention onsite. The stormwater pond is also an aesthetic amenity for residents.

Recreational walkways are provided within the subdivision, but also connect to the greenway recreation network to provide access to regional amenities.

Homes are clustered to provide a neighbourhood context. Homes view onto a common green and not to neighbouring buildings.



Smaller lot sizes allow the stream, its riparian corridor, and a generous setback buffer protecting fish and habitat to be retained.

Total numbers of building units are maintained in both development scenarios. Open space is legally protected to ensure that natural values are maintained forever.

Greenway Interfaces

Agriculture

Managing for Ecosystem Values on Agricultural Land

Agricultural working landscapes can be an important component of a continuous green space network. Agricultural producers manage much of the land on the urban fringe and many of their needs are compatible with good stewardship.

Being aware of the potential for friction between greenway uses and agricultural production, and planning to avoid conflicts will build cooperation. The information below introduces some of the potential issues and suggests management techniques and additional resources which can help to make these adjacent uses more compatible.

Protecting Land for Agriculture

Land which is suitable for agriculture is a finite resource, and in most cases productive lands are included as part of the Agricultural Land Reserve in B.C. The *Farm Practices Protection (Right to Farm) Act* provides additional legislative support to ensure that productive agricultural land is not converted to, or impacted by, non-agricultural uses.

Greenway managers must be aware of ALR designations adjacent to or affecting greenways. Greenway land, whether it is maintained for conservation or recreation, should be managed to minimize impacts on adjacent agricultural land.

Managing Public Access

Direct or indirect public access onto agricultural land can create land use conflicts. Farmers frequently experience malicious and/or accidental damage to animals, crops and equipment. To reduce this problem greenways should:

- n** Restrict uncontrolled access to agricultural land by keeping trails away from farm land.
- n** Where necessary, purchase or negotiate access easements on agricultural land and provide fencing, hedging, or other controls to limit further access beyond the easement.
- n** Refer to the *Landscaped Buffer Specifications* prepared by the British Columbia Agricultural Land Commission for detailed planting and fencing requirements to control access where direct proximity with recreational uses cannot be avoided.

Natural greenways can provide effective buffers between adjacent land uses. Consider using native plant species and incorporating stormwater management ponds to create a variety of habitat opportunities.



Vegetation Management

Greenway land which is maintained for conservation purposes can create a conflict if the impacts of vegetation control practices on adjacent land are not managed carefully.

Greenway managers should:

- n** Control weedy species so as not to interfere with crop production on adjacent agricultural land. This is of particular importance in areas left to regenerate naturally, as weedy species are common in the first stages of succession.

Farmers should:

- n** Use a program of integrated pest management which minimizes the use of chemical pesticides and is compatible with good farm stewardship and the conservation of natural systems.
- n** Maintain a 10 metre wide pesticide free zone next to any natural watercourse, and avoid pesticide drift into this zone.
- n** Apply pesticides sparingly and with particular care adjacent to natural areas to avoid drift.
- n** Refer to the *Handbook for Pesticide Applicators and Dispensers* from BC Environment for more information.
- n** Manage range and pasture lands to maintain ecosystem health. Refer to *Environmental Guidelines for Beef Producers in British Columbia* for detailed stocking information.

Air Quality

Burning, manure spreading, and pesticide spraying can create conflict between agriculture and non farm uses. Greenways, which are less affected by this type of disturbance, can provide an important buffering function.

Greenways should identify potential conflicts between residential and agricultural use and consider the following:

- n Purchase land, or negotiate conservation easements, for buffering strips between incompatible land uses.

- n Develop management plans which ensure existing vegetation is retained over the long term.

- n Limit recreation uses close to agricultural land to reduce exposure to farm smells and dust.

Soil Quality

Greenways which can include agriculture and other private working landscapes, can use landowner contact, peer agrologist review, and public awareness to promote solutions to potential soil quality problems by:

- n Promoting good manure management practices which maintain soil quality and minimize the potential for contaminated runoff and nutrient loading to aquatic habitats.

- n Encouraging the use of soil management practices to control soil erosion.

- n Educating about the costs and negative impacts of over reliance on pesticides and irrigation.

The *Environmental Guidelines* series prepared by the Ministry of Agriculture, Fisheries and Food identify specific methods to help all agricultural operators mitigate potentially negative effects. Greenway managers should be familiar with these guidelines.



Fencing riparian areas allows easier management and protects against incremental damage to environmentally sensitive areas.

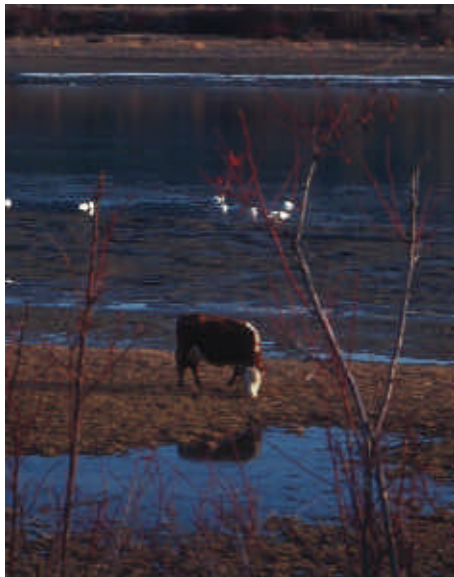
Water Quality

Greenways should encourage practices to maintain good water quality, which can benefit agricultural producers and natural systems.

- n Install drainage controls to ensure that contaminated runoff does not pollute watercourses.

- n Support the use of livestock waters so that cattle do not have direct access to streams where water quality impacts would result.

- n Watch for adverse effects of irrigation including reductions to stream flow, and salt buildup in agricultural soils.



Grazing practices should be managed to ensure that natural systems are not damaged as a result of overgrazing, trampling of riparian areas, or nutrient runoff from manure into waterways.



Supporting Farm Stewardship

Greenway programs should look for ways to encourage ecological responsibility by producers. Land - owner contact programs are very effective.

Producers generally have a high appreciation for biology and the needs of living things. Caring for natural systems is part of their ongoing business.

Greenway landowner contact programs should:

- n Provide information on the biological and recreational values of the farmer's land.

- n Encourage voluntary conservation of sensitive habitats, through public recognition of these actions. A sign posted at the farm gate can recognize stewardship behavior.

- n Encourage fencing of riparian areas, and restoration of natural vegetation by arranging for volunteer labour or work crews from service clubs.

- n Establish an annual subsidy for habitat protection measures (e.g. fence maintenance, off-stream watering devices, or wildlife crop damage). Local service clubs may provide support for these activities.

- n Assist in efforts to trigger existing provincial cost sharing programs for farm environmental improvements.

- n Determine if a conservation covenant to protect and manage natural areas is possible. Consider if there is a tax credit trigger. Or consider a trust arrangement with the land owner to place the covenant when ownership of the land is transferred.

Greenway Interfaces

Forest Lands

Greenways and forest lands can be managed with similar objectives

Forest lands may account for large areas of natural green space within urban or near-urban watersheds. Although this land is part of a working landscape, in many situations greenway management objectives are compatible with forest land management objectives. The Forest Practices Code describes many of the tools which are to be used to protect visually sensitive areas, recreational uses and environmentally sensitive areas.

Are Forests Greenways?

The working forest can be a significant part of a Greenway system. In BC, working forest can be either crown land under forest tenure, or private forest land under the Forest Land Reserve.

Greenway approaches will vary:

n On crown land, the application of the Forest Practices Code will incorporate most Greenway values. Coordination of trail alignments may be all that is necessary.

n On private land, the principles of the Forest Practices Code provide a guide to responsible management.



Where forest recreation areas are included as part of greenway, interpretive signage can be used to explain environmental objectives.

Sensitive Areas

The Forest Practices Code states that special management areas should be created where special circumstances require that areas are to be treated differently from the surrounding area. This mandate provides a opportunities for greenway managers to work in cooperation with forest land managers to plan for and protect significant recreational resources, visual resources, and biological diversity.

Recreational Amenities

Natural forested areas can support a wide range of recreational opportunities and the recreational value of these lands should be considered as an integral component of the resource base of forest lands.

Forest land with recreational value should be managed according to:

- n** public recreation needs;
- n** the capability of features to attract and sustain use;
- n** the recreation experience;
- n** the uniqueness and quality of features; and,
- n** the sensitivity of features.

The Forest Practices Code

'The purpose of the Forest Practices Code is to ensure that a high level of forest and range stewardship is established and maintained in British Columbia'

'The Forest Practices Code recognizes the need to manage forest lands to maintain visual, recreational, and biological diversity resources. Included within the Code are guidelines enabling the establishment of special management areas for the protection of: visually sensitive areas, areas containing significant recreational resources, and specific areas ... for the management of biological diversity.'

As described in the Forest Practices Code biological, physical, cultural, or visual features that have an ability to attract and sustain recreational use should be managed so that their recognized inherent values are protected, maintained, or enhanced according to the principles of integrated resource management.

Greenway managers should provide recreational use data so that forest lands, which are identified as part of a greenway network, can be managed to provide a broad range of recreation experiences.

Priority for recreational classification in forest land will be given to those areas where public demand for a specific recreation experience is increasing and the opportunities for that experience are decreasing.

Recreational use of forest lands by the public can be facilitated by forest land managers through the provision and maintenance of roads, recreation sites, recreation trails, and interpretive forest sites that are safe, sanitary, socially acceptable, and environmentally sound.



Under the Forest Practices Code, management of forest land must consider ecological, recreational, and visual factors.

Ecological Resources

Forest land must be managed to protect ecological resources, and to keep natural systems intact. In this respect forest land management and greenways are compatible. To protect specific ecological resources, the Forest Practice Code identifies the following special management areas.

Riparian Management Areas

Are required along all streams and around all lakes and wetlands to:

- n Maintain water quality, stream channel function, and aquatic ecosystem diversity.

- n Sustain the diversity and productivity of wildlife and vegetation within forest land.

The sizes of Riparian Management Areas are identified in the Code.

Wildlife Habitat Areas

Are created to maintain, enhance, or restore habitats and populations of wildlife including:

- n Threatened or endangered species (Red List)

- n Vulnerable species (Blue List)

- n and regionally important species.

Habitat mapping of red-listed species and regionally important species is the responsibility of the tree farm license holder.

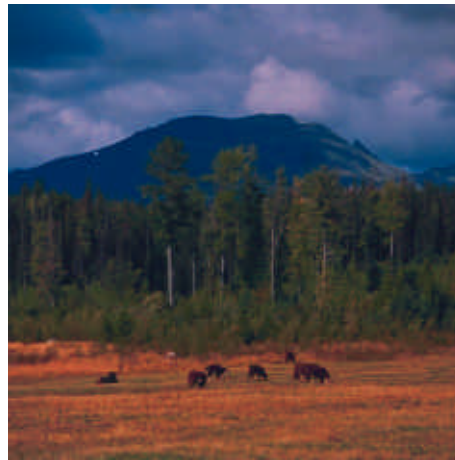
Lakeshore Management Areas

The purpose of the lakeshore classification system is to recognize and protect the unique combination of fish, wildlife, water, and recreation values that occur on and around lakes. No harvesting is permitted within the lakeshore management zone except as required for the management of windthrow, pest, disease, or fire, or as specified in approved lake management objectives.

Visual Quality Objectives

Visual quality objectives are established for forest landscapes that provide the scenic backdrop so highly valued by the public and tourism industry in British Columbia.

Operational plans should ensure that forest operations are harmonized with the natural visual character of areas, according to the established visual quality objectives and principles of integrated resource management.



Range Use Plans must be completed under the authority of the Range Act and must be renewed every five years. Greenway managers should cooperate with producers during the preparation of these plans to ensure that greenway objectives are met.

Range Land

Leased range land must be managed in accordance with the guiding principles set out in the Forest Practices Code, including:

- n Protect and conserve healthy, diverse, and self sustaining ecosystems.

- n Ensure the long term health and productivity of plant communities.

- n Provide range enhancements as required to meet the objectives described above.

Greenway managers and agricultural producers can look to the *Environmental Guidelines* series from the BC Ministry of Agriculture, Fisheries and Food for more detailed range management information.



Forest Renewal BC's Watershed Restoration Program

The Watershed Restoration Program has been established to restore environmental values, and to enhance the productive capacity of forest lands.

In watersheds where forest land is to be managed as part of a greenway program there are many opportunities for joint cooperation between greenway projects and Watershed Restoration projects.

Restoration

One of the main objectives of the Watershed Restoration Program is to repair past environmental damage, by restoring logging roads and enhancing habitat for fish and wildlife. In many watersheds projects have already begun which have focussed on clearing blocked streams, restoring river channels, and improving fish habitat.

Protection

In addition to restoration works, Forest Renewal BC is helping to promote good forest practices which can help to sustain the integrity of ecosystems and protect habitat.

The common purpose of the Watershed Restoration Program and greenways will provide many opportunities for cooperative action.

Greenway Interfaces

Floodplains

Encouraging land use decisions compatible with the natural processes of rivers.

Floodplain management balances compatible uses with the realities of floods. Appropriate use includes activities which are compatible with the many other environmental functions of floodplains such as - groundwater recharge, water quality, wetland and riparian habitat, and biodiversity. There are many opportunities for cooperation between floodplain management and greenways.

The Value of Floodplains

In British Columbia, floodplains are a small proportion of the land base. In spite of this limited land area, the economic importance of floodplains is substantial. For example, the Lower Fraser Valley, most of which is a floodplain, now contains over half of the population of British Columbia.

n Gentle slopes mean that land is easily serviced and therefore under great pressure for land development.

n Floodplains are valuable agriculture resources because of their natural fertility and productivity.

n Many transportation and communication links are located in floodplains. When these flood, there can be consequences for areas much larger than the immediate floodplain.

n Floodplains serve an important environmental function providing many links in natural biological and hydrological systems.

Flood Protection

Flood protection has been a process of identifying risk areas, and implementing strategies which can minimize exposure to risk, for example:

n Allowing development within floodplain areas, but requiring that structures be raised to an elevation which is safe from flooding.

n Developing storm sewers and drainage channels to reduce local flood risk by transporting floodwaters more quickly downstream.

n Building dykes which effectively separate developed areas from flood dangers.

The application of flood protection technology to deal with localized problems, without adequately considering downstream or cumulative effects, has caused many unexpected results.

In light of this experience, floodplain management is now much more likely to restrict development in high risk areas, and to accommodate a great range of flows providing a safety valve for severe storms.

What are Floodplains?

Floodplains are the relatively low and periodically inundated areas adjacent to rivers, lakes, and oceans. Floodplain lands and adjacent waters combine to form a complex, dynamic, physical and biological system that supports a multitude of water resources, living resources and societal resources. Floodplains provide ... natural flood and erosion control, water filtering processes, a wide variety of habitats for flora and fauna, places for recreation and scientific study, and historic and archeological sites. They are also the locus of a variety of human activities, including commerce, agriculture, residence, and infrastructure.

Unified National Program for Floodplain Management



Managing Natural Systems

Recent efforts in floodplain management have focused on integrated management. This not only reduces flood loss, but also protects floodplains as environmental resources and provides room for flood flows to spread out and dissipate with a reduced amount of erosive force.

Habitat

Floodplains are critical as wildlife habitat including marshes and wetlands, but also as the aquatic habitat necessary to maintain fish production.

Water Quality

Because floodplains play such an important role in the hydrological cycle, they have significant impacts on water quality.

Erosion and Sedimentation

Development in floodplains can lead to increased damage to soils and water quality as a result of inadequate protection against sedimentation. Erosion control practices which reduce sedimentation under non flood conditions may become completely overwhelmed during flood events.

Permeability

Development in any watershed usually includes reductions to soil permeability through paving for parking, roads and building rooftops. Reduced permeability increases the frequency and severity of flooding.

Integrated Floodplain Management

With a change in emphasis, floodplain management objectives are compatible with the environmental objectives of a greenway program.

There are many opportunities to incorporate flood protection as part of a suite of environmental objectives which are overlapping and cost effective.

As part of an integrated management process, it will be possible to achieve multiple environmental goals more effectively. Innovative flood loss protection techniques, which may not have been practical outside of a Community Greenways program, will be more appropriate as part of an integrated management approach.

n Development in riparian corridors, which are most sensitive to flooding, will be restricted.

n More elaborate comprehensive development tools which may not be appropriate to manage against flooding alone will be supportable to protect the combined values of ecological integrity and flood loss reduction.

n Environmental organizations accepting conservation covenants can manage jointly for the compatible goals of habitat production and flood loss reduction.

n Floodplain covenants under s. 82 of the Land Title Act could be coordinated with Conservation Covenants under s. 215, so that covenant areas and conditions match.

n Land set aside for stormwater detention areas may be dry except during periods of peak flow and may be managed to maximize the benefits of this land for habitat and conservation uses.

n Detention ponds and constructed wetlands may provide stormwater detention to reduce the occurrence of minor floods, while at the same time providing habitat functions.

*A River is water in its loveliest form;
Rivers have life and sound and movement and infinity of variation;
Rivers are veins of the earth through which the life blood returns to the heart.*

Roderick Haig-Brown
A River Never Sleeps

New Initiatives in Floodplain Management

Changes to legislation and provincial policy are helping to make the goals of integrated floodplain management more attainable.

Changes to the *Municipal Act* (s. 963) allow zoning to specify different regulations for different locations within a zone. This power would allow for special clauses specific to the parts of a zone that are within a floodplain.

For example, a maximum allowable area of buildings, structures and paving could be established for uses with the floodplain. The remaining land would remain suitable for floodplain storage. This approach, if enforced, could have dramatic advantages for floodwater storage and significant savings on downstream flood prevention works.

Using the soil removal and deposition section of the *Municipal Act*, a regulation could be created to limit the amount of fill within a floodplain area.

The Fraser Basin Management Program is facilitating the establishment of a task force of federal, provincial, and local government representatives to define potential agreements to support the goals of integrated floodplain management.



Using the *Municipal Act* to create specific regulations for floodplain areas it will be possible to allow development which does not restrict the natural functioning of floodplains.



Photo Credit: NorthWest Hydraulic

Integrated Floodplain Management on the Vedder River

The Vedder River is located among some of the most valuable farmland in British Columbia. As agriculture expanded along the river, the threat to the physical and economic well-being from flooding also grew.

The Flood Management Problem

The Vedder River channel receives large amounts of glacial sediment and debris. As the river enters the valley bottom, the surrounding terrain becomes flatter, the water in the river slows and the deposition creates an alluvial fan or delta. As the sediment accumulates the channel size is reduced and flooding occurs.

The Solution

As it was not practical to dyke the river channel an alternative was implemented which allowed the river to behave in a more natural fashion. The project was implemented in three phases.

First, the river bed and bars were scalped and the channel banks were raised and repaired. This work was necessary as a flood in December 1975 had filled the channel with gravel.

The second phase of the project was undertaken from July to August of 1976. The river channel was excavated which increased the capacity of the channel to handle moderate winter flows.

In the final phase, private land was purchased to allow for a wider floodway. Setback dykes were built to increase the carrying capacity in the existing channel to handle flows in excess of the 200 year flood.

Using this technique, reliable flood control is provided. In addition, the river side channels provide opportunities to enhance fisheries and an environment for a variety of recreational activities.

Greenway Interfaces

Integrated Watershed Management

Managing our common future.

Water is a unifying medium. Its flow through natural systems touches us all and connects us as part of a single natural system. Photosynthesis powered by the energy of the sun, along with clean water, land, and air are the basic building blocks of life.

Each of the preceding sections deals with individual aspects of land use planning. The integration of these processes is the objective of integrated watershed management and should be the common theme of all planning agencies within a watershed. Our collective ability to manage the ecological functions of a watershed will be an indicator of success in managing our common future.

Assembling the Pieces

Planning to incorporate rapid human development into complex natural systems means that agencies which have been established to deal with one resource must begin to look for innovative and cooperative alternatives.

This process is already at work with many agencies. For example:

- n** Constructed wetlands which provide wildlife habitat are becoming more common as a solution for stormwater management.
- n** Fisheries managers concerned with maintaining fish stock are active in guiding development so that habitat is not lost.
- n** Parks planners recognize and plan for the multiple use of open space as recreational amenity and conservation areas.

The process of greenway planning is one of looking for common purpose between ecological functions and technical solutions. Common solutions are required which include the multidisciplinary expertise of many participants.

Realizing Common Objectives

To advance the process of integrated watershed management, people must continue to search for common objectives. As development within watersheds increases, the solutions to specific problems begin to overlap jurisdictions. In response, new partnerships form to find solutions to more complex problems.



A pond built and paid for as a stormwater protection measure also provides habitat, visual, and recreational amenity. This kind of integrated solution combines the experience and resources of many people to create a more complete and lasting solution.

Building Consensus

The gradual overlapping of interests which occur as watersheds become more populated creates the need to act in ways which are acceptable to larger groups of people.

Creating the environment for action means that agencies must show leadership in finding consensus and establishing integrated processes.

Cooperative Funding

Creating mechanisms of integrated management means that funding partnerships will also be required. The necessity for such partnerships is forced by:

- n** Reduced overall spending for planning, design, and management.
- n** More populated watersheds which require solutions for specific problems that can affect many more people.
- n** Solutions to more complex development problems require that a greater number of individual criteria must be satisfied.
- n** Advanced technical expertise provide opportunities for effective solutions, but these may be more elaborate and expensive than in the past.

All of these separate constraints suggests that integrated funding solutions are imperative - as a way to draw the individual pieces of a solution together into an affordable and broadly supportable action plan.

Moving Forward

Moving along the path toward integrated watershed management will be difficult. Coordination among large agency partnerships requires a large effort and on-going maintenance of communication.

On the other hand, the fundamental need to search for the creative solutions implied by this process is compelling. Failure to manage development within fragile watersheds in an integrated and ecologically responsible manner will destroy our natural legacy for future generations.

Greenway Management

Included in this section:

- 4 Maintaining Healthy Ecosystems**
- 4 Risk Management**
- 4 Enjoyment**

Like any major undertaking, greenways require on-going management. This section addresses greenway issues that may be faced by operations administrators, including a checklist of maintenance considerations, risk management strategies, and operating principles to maximize public enjoyment of the greenway system.

**Community
GreenWays**

Greenway Management

Maintaining Healthy Ecosystems

Managing use within Limits of Acceptable Change

Creating a greenway program will raise the level of understanding about healthy ecosystem functions in the community. People will understand that if the quality of water, air, and habitat decline so inevitably will their own quality of life.

With this public awareness will come a new challenge to greenway operations managers and maintenance personnel - to adapt their practices to methods that maintain healthy ecosystems.

Natural systems embrace the ongoing process of change as part of their natural function. Through their rich diversity they provide many alternate solutions to accommodate new and diverse circumstances. The ability to change is what ecologists refer to as 'adaptation' or 'auto-poiesis'. Simply, this means that healthy natural systems have a built-in ability to renew themselves in response to changing situations.

When development and human use within watersheds is relatively limited, the natural system can adapt. As development and use grows, however, and if the diversity which defines healthy natural systems is reduced, then the ability of ecosystems to respond to changes is also very rapidly reduced.

These checklists provide a starting point to maintaining diverse and healthy ecosystems in greenways . . .



Limit Human Disturbance

- ✓ Identify and protect areas which are extremely sensitive to disturbance.
- ✓ Identify the seasonal variations in sensitivity.
- ✓ Design recreational facilities to avoid disturbance in sensitive areas.
- ✓ Restrict access when seasonal disturbance is a factor.
- ✓ Install barriers to public access when risks of disturbance are critical.
- ✓ Use innovative barrier design e.g. mud, water, steep slopes, thickets, hedges, handrails.
- ✓ Inform the public about sensitive sites or species.
- ✓ Monitor for incremental changes or disturbance.
- ✓ Limit necessary construction or repairs to periods when works can be undertaken with the lowest risk.



Air Quality Management

- ✓ Use land use regulations to encourage compact communities.
- ✓ Provide opportunities for mass transit where feasible.
- ✓ Incorporate principles of transportation demand management into community planning decisions.
- ✓ Provide alternate transportation facilities - cycling and walking trails - from home to work or school.
- ✓ Discourage the use of cars where possible.
- ✓ Minimize energy inputs to greenway maintenance.
- ✓ Educate people on the role of plants in filtering air pollution.
- ✓ Support greenway revegetation projects.
- ✓ Support community forestry.
- ✓ Support urban street tree planting.



Vegetation Management

- ✓ Encourage conservation of native vegetation where feasible, in particular in ESA areas and where larger woodlands can be conserved.
- ✓ Restore damaged habitats with native species which have a habitat function.
- ✓ Encourage a Naturescape program for backyard wildlife habitat.
- ✓ Review open space and parks maintenance levels to increase the areas left as background or service maintenance standards, or allowed to regenerate naturally.
- ✓ Review pesticide and herbicide practices, to minimize use and to encourage integrated pest management with a high tolerance to minor damage.
- ✓ Design new landscapes with low level maintenance schemes in mind, and rely heavily on retention of natural settings to avoid pressure for highly manicured solutions.
- ✓ Devise a program to stop the spread of escaped exotic plants like broom, bramble and purple loosestrife, or noxious weeds.



Stormwater Management

- ✓ Minimize the overall area of impermeable surfaces so that rainfall runoff can move through the watershed in rates and patterns generally similar to natural conditions.
- ✓ Promote infiltration on-site and reduce the overall quantity of water entering the storm drainage system.
- ✓ Control development within the floodplain so that the natural cycle of flooding can continue without expensive flood protection measures.
- ✓ Maintain natural watercourses, including aquatic and adjacent riparian vegetation.
- ✓ Plan stormwater management at a watershed scale.
- ✓ Include opportunities for sizeable detention areas throughout the watershed.
- ✓ Encourage the development of ponds which can provide habitat, visual and recreational amenity, and stormwater detention functions.
- ✓ Design water channels with enough capacity so that natural vegetation can regenerate without adversely affecting the hydraulic capacity of the channel.



Water Quality Management

- ✓ Plan for and maintain vegetated riparian corridors adjacent to all natural watercourses.
- ✓ Install sediment traps to assist in removing waterborne sediments before they enter streams.
- ✓ Design water inlet and outlet structures which are stable and erosion resistant.
- ✓ Control development on areas with poor soil and steep slopes to minimize the potential for erosion.
- ✓ Provide erosion protection during new construction and for sites which are susceptible to erosion.
- ✓ Restrict the development of activities which may pollute within floodplain areas.
- ✓ Protect natural watercourses and wetlands so that their natural cleansing processes might be maintained.
- ✓ Use vegetated swales to provide water filtration.

Greenway Management

Risk Management

Managing to reduce the potential for injury or property damage.

Creating a greenway, whether for conservation of recreational use, will involve a greater degree of public liability than for unidentified natural areas. In particular, built facilities such as stormwater detention ponds, trails, bridges and similar structures are likely to attract more public use, and therefore liability. The design of these facilities should recognize the responsibility for public safety and ensure that care is taken to incorporate protective measures.

Water Facilities

Many factors can be incorporated into the design of ponds and stormwater detention facilities to ensure that they are as safe as possible and that the 'duty of care' to protect the public has been demonstrated.

n Provide shallow water at pond edges, in particular in areas close to trails.

n Create a gradual slope on the public side of a pond to offer a 'beach' style of water entry.

n Control access by providing a barrier of mud and emergent plants in heavier soils.

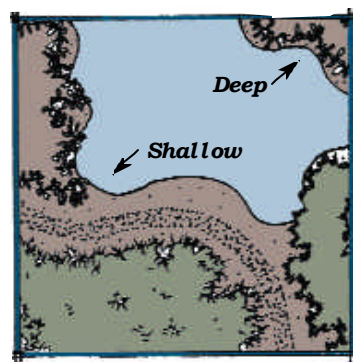
n Locate the deepest parts of the pond toward the centre or closer to parts of the shoreline which have restricted public access.

n Provide signage which warns people of the potential water hazard risk. Identifying risk in a public way can significantly reduce liability.

n Install fencing around water features only in extreme cases. Design necessary fencing to be low and unobtrusive. Illustrating a clear demarcation of the hazard zone is all that is necessary to show duty of care.



Barrier planting can provide a recognizable but unobtrusive separation between water features and public access, and demonstrates a 'duty of care' to protect the public.



The design of water features should provide shallow access adjacent to pathways. Public access should be restricted adjacent to deeper water.

Recreational Trails

Trail design and maintenance should incorporate the principle of voluntary assumption of risk.

n Design and publish a trail guide which rates trails according to their difficulty.

n Develop policies on trail usage - identifying which groups of people are to be allowed to use which trails.

n Design and construct trail alignments, width, grading and surfacing to meet basic standards for the recommended users.

n Install trail route signs at all major entry points, with both the allowed trail users and trail rating noted, and recommended rules of trail etiquette posted.

n Identify known permanent hazards along trails and mark them with signs on posts (signs on pavement may not be read).

n Identify temporary hazards, including areas awaiting maintenance, with signs or markers.

n Provide handrails to protect against vertical drops due to retaining walls over 600mm high, or very steep slopes, which are close to



Provide handrails along public pathways wherever steep slopes or sharp changes in grade occur.



Signage identifying hazards allows people to make their own decisions about accepting the risk of using particular facilities.

areas of public access.

Natural Hazards

The risk posed by natural hazards will be less than for built hazards discussed in the previous section. Part of the reason for this reduced liability stems from the recognition that accidents from natural hazards occur as the result of an “Act of God.” Further, responsibility to greenway users does not extend to acts of irrational or extreme behavior. However, a duty of care exists to protect the public who use the greenway in a ‘reasonable’ manner. To protect greenway users from natural hazards:

n Avoid routing trails close to natural hazard areas like the top of vertical cliffs or undercut banks.

n Provide alternate seasonal routes - e.g. to avoid avalanche slopes in winter, or to route via a street system around a floodplain during high water events.

n Mark natural hazards prominently to identify hazards and reduce liability.

In cases where public access must come close to natural hazards, barrier design solutions should be sought which balance aesthetics and cost against risk. The reason for a barrier design on challenging trails is to provide notice to a reasonable adult that a risk is present.

The duty of care to children is greater than that to adults, and therefore, on more urban trails where a significant number of unsupervised children may be present, the barrier design should effectively deter access by children.

There are many alternatives to barrier design other than chainlink fence. Many barriers can have the appearance of handrails, farm fences, hedges, thickets, wetlands or can be integrated with other structures



For natural hazards it is sufficient to provide protection designed for a reasonable adult user. In urban areas where more children are present it may be necessary to effectively restrict access to natural hazard areas.

(decks, buildings, noise walls, etc.).

Theft and Vandalism

Public concern about trail establishment often focuses on fears of increased crime. The potential for assault, theft and vandalism are often issues during the establishment of new trail systems.

Surveys of constructed trails do not support this fear.

For example, in *Evaluation of the Burke-Gilman Trail’s Effect on Property Values and Crime* by Seattle Engineering:

n “none of the (110 surveyed) residents felt the trail should be closed,

n less than 3% thought problems serious enough to cause them to consider moving (all due to less privacy, not more crime)”

n “Almost two thirds (63%) of the residents felt the trail increased the quality of life in the neighbourhood (only 5% felt it had decreased).”

In general, experienced trail managers suggest that theft is a much greater issue from streets and driveways (where access to getaway vehicles is easy) than from trails where vehicles are not allowed.

Surveillance of the trail can alleviate risks of assault, and minimize vandalism.

n Passive surveillance can be provid-

ed by trail routings which can be viewed from roads or housing, or by avoiding long stretches of trail through areas of heavy undergrowth.

n Active surveillance of trails can be provided by volunteer organizations, such as Citizens on Patrol (COPs) and Volunteers in Parks (VIPs). In high use areas, bicycle police or horse mounted police have been very effective in enforcement of trail regulations.

Where problems do occur on greenway trails, they are often no more severe than similar problems on streets, in public buildings, and in automobiles and houses, and yet these problems are used as reasons not to have public green space.

Rather than banning the green space, problems can be reduced by closing problem areas e.g. by fencing off areas of thick woods which have been the site of vandalism, assaults or rowdiness. Often the closing of these areas need only be as long as a certain condition prevails e.g. until a group of neighbourhood vandals grow up.

Some trail systems might include alternate routes for day and night - an unlit route for day use, and an alternate lighted street alignment for night use. Both alignments would connect to the same location at each end.



Passive surveillance from nearby houses and streets can provide a strong deterrent to theft and vandalism.

Windthrow Hazards

Windthrow occurs when trees are overturned or broken from the force of the wind.

Catastrophic windthrow occurs when exceptionally strong winds flatten large areas of forest. Events of this type are a rare occurrence of weather, and because they cannot be planned for they are not discussed here.

Endemic windthrow, however, generally occurs on a smaller scale and windthrow sites can be identified as high hazard areas even in normal seasonal winds.

These pages introduce the windthrow topic. For more complete guidance refer to the *Windthrow Handbook for British Columbia Forests* available through BC Forests.

Windthrow Hazard Evaluation

Windthrow hazard can be evaluated by examining several variables.

In general, large trees withstand many storms over the course of their lives. As a result, most are windfirm for the natural conditions which surround them. It is when the growing conditions change due to adjacent clearing, thinning or disturbance that risk of windthrow for large trees increases.

The table on the facing page suggests how site characteristics, tree variables, and proximity of nearby trees can have a major impact on windfirmness.

Clearing and Thinning

Densely growing, even aged stands of timber provide a 'damping' effect on sway caused by wind, and the natural edges of dense stands will have greater windfirmness than the interior, due to historic exposure to winds.

n Thinning of dense stands can eliminate the damping effect, and can expose individual trees grown in the stand to windthrow.

n Clearcutting can open new edges of dense stands, and the windward side of the clearing will be subject to new wind exposures, especially at corners which funnel winds.

Cutting or thinning can create a high risk of windthrow in high hazard sites for several years after the change. Over time those trees that survive will grow reaction wood to counter the newly felt wind forces.

Other Construction Activities

Windthrow hazard can also be increased by construction activities, such as:

n Grubbing activities which disturb roots within the drip line of trees.

n Trenching within the root zone, for utilities, drains, etc.

n Grading activities within the root zone, especially cut.

n Physical damage to the tree by falling of other trees, and disturbance by equipment or yarding operations.

Windthrow Management Practices

Windthrow management in developing areas is often associated with vegetation which is left to buffer environmentally sensitive areas. Strategies to minimize risk include:

n Setting back buildings from the leave area. For example, by providing deeper rear yards at lots adjacent to leave strips.

n Allowing natural windfirmness to develop prior to construction. For example, by clearing the proposed development site 3 or more years in advance of building construction, and allowing natural windthrow to occur and a new windfirm edge to develop.

n Varying the location of the leave area boundary. For example:

-widening the leave area to provide additional buffering to areas of high risk of windthrow.

-selecting an area of low risk for leave area boundaries, such as deciduous trees, natural edges, low water table.

-minimizing edges of leave areas which are perpendicular to storm winds.

-where leave area boundaries run generally parallel with storm winds, avoiding narrow protrusions which jut out from these boundaries.

n Treating the vegetation in the leave area by:

-controlling boundary clearing and grading practices to avoid damage to anchor roots of trees to remain.

-pruning to reduce the crown by 20-30% can be effective. This should be by limbing - not topping - of trees.

-feathering of the forest edge would remove high risk individual trees, but should not exceed 15-20% of the trees in a strip 20-30m in from the edge of the stand. Feathering is not recommended in even aged, dense stands.

-in very high hazard areas where other approaches are not feasible, localized clearing and replanting could be considered. The localized clearing could be either patch clearcut or selection cut depending on the stand characteristics. Stumps in ESA areas should be closecut, not grubbed. Understorey vegetation should be left for shade and cover.

n Replanting disturbed areas on high risk sites will generally avoid future windthrow problems since trees will be open grown in most developing areas. If replanted areas are large enough to create forest interior conditions, then planting at wider spacings, or early thinning to create wider spacings, will increase windfirmness at maturity.

Wind Force Factors:

after *Windthrow Handbook for British Columbia Forests*

High Hazard

- topographically exposed locations: crests, saddles, upper slopes, etc.
- boundaries on the windward edge of a stand
- tall trees
- large dense crowns

Moderate Hazard

- boundaries parallel to the storm wind direction
- trees of intermediate height
- moderately dense crowns

Low Hazard

- topographically protected locations
- boundaries on the lee edge of a stand
- short trees
- small open crowns

High Hazard

- trees with low taper and no butt flare
- shallow rooting (<0.4m)
- root rot areas
- shallow soils (<0.4m)
- poorly drained soils

Moderate Hazard

- trees with moderate taper and moderate butt flare
- moderate deep rooting (0.4 - 0.8m)
- moderate deep soils (0.4 - 0.8m)
- imperfectly to moderately well-drained soils

Low Hazard

- trees with high taper and large butt flare
- deep rooting (>0.8m)
- no evidence of root rot
- deep soils (>0.8m)
- well-drained soils

High Hazard

- moderate to extensive natural windthrow present
- extensive windthrow present on similar adjacent cutting boundaries
- pit and mound micro-topography

Moderate Hazard

- minor natural windthrow present
- minor to moderate windthrow present on similar adjacent cutting boundaries

Low Hazard

- no natural windthrow
- no windthrow on similar adjacent cutting boundaries
- no evidence of pit and mound micro-topography

Windthrow in Perspective

There is no substitute for local observation of windthrow. In some communities the risk of windthrow is very low because of favorable soil, groundwater, exposure and climate conditions. In all communities the risk of damage can be reduced to negligible by a combination of the strategies outlined above.

Windthrow can cause damage, but it is not a significant factor in setting the rates of either the Insurance Corporation of British Columbia or the Municipal Insurance Association.

Resolving Use Conflicts

Another class of risk is associated with conflicts or collisions among different user groups on a trail. Risk management strategies can include:

n Trail designation and marketing, to make it clear what user groups are allowed. For example, compatible uses on narrow trails are walking, hiking, jogging, birdwatching, and nature studies.

n On wider, flatter trails additional uses might include: bicycling, roller blades, wheelchair access, farm access.

n Where manure is not a problem, and use by other classes is light, equestrian use can be mixed with the above uses.

n Winter uses can include cross country skiing and snowshoeing. Allowing motorized uses such as snowmobiling or trail bikes should be done only with caution (see Liability and Insurance on Page 69).

Conflicts in multiuse trails can be minimized by establishing codes of trail etiquette and advertising them on signs and published trail guides. e.g.

n Stay right.

n Pass on the left, with an audible warning.

n Groups of users should not span more than half the width of the trail.

n Yield to slower moving traffic, and adjust your speed to suit conditions. Alberta's *Cycling Safety Handbook* says "when encountering horses and riders, dismount, move off to the low side of the trail allowing them to pass, and speak in a moderate volume. When overtaking horses, slow down, signal your approach, and ask the riders how best to pass."

n Do not trespass on neighbouring property.

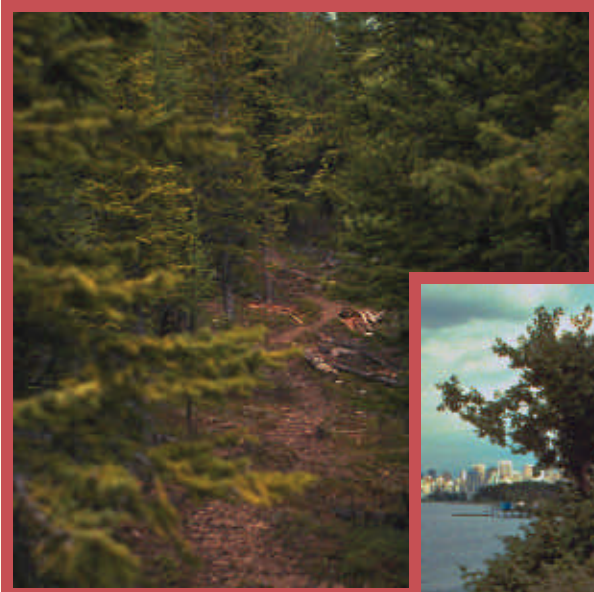
n Respect nature - do not litter, pick flowers or feed wildlife or livestock.

n Cross intersections with caution.

Trail design - width, surfacing, grades, and barriers - should be appropriate to the use classification.

User conflicts can be reduced by education - at special events, through the media, by advertising, by training sessions in user group clubs, and by peer pressure.

Regulation and enforcement is not often necessary, and is a last resort. Enforcement will likely rely on a mix of police action and voluntary patrols.



Pathways should be designed to accommodate different levels of use. Urban pathways with many users, including cyclists and in-line skaters should be wide, and durable.

Liability Considerations

Liability for trails in British Columbia is regulated under the *Occupiers Liability Act*.

Assessment of liability will be made by the courts on the basis of the standard of care set out in the *Occupiers Liability Act*, based on the principle that the occupier of premises owes a duty of care to all persons who enter on the property, including invitees and trespassers.

Under the Act, an occupier is defined to include a person who has responsibility for and control over the condition of premises; the definition is not limited to those physically occupying premises. Occupiers owe a duty to take the care that is reasonable in all circumstances to see that a person entering on the premises will be reasonably safe in using the premises. An occupier has no duty of care as regards risks willingly accepted by a person entering the occupier's lands, except a duty not to act with reckless disregard or create a danger with intent to harm the person.

In applying these principles, the courts have been guided by the principles of negligence law. Occupiers liability law is quite complex, and legal counsel and insurers should be consulted on a risk management strategy specific to your greenway project. General strategies for avoiding liability include:

n mark potential hazards with signs.

n establish a trail rating and allowed users, and design and maintain the trail consistent with the use and rating class.

n a key principle in defense against negligence is the voluntary assumption of risk. Encourage the public to make a conscious choice when using a trail, and to be aware of the inherent risks by entrance signage, trail maps, etc.

n managers should be aware that their liability is reduced by contributory negligence by the user and by Acts of God.

n trails which allow motorized users are a greater risk due to the potentially more severe injuries associated with such use. Liability can be reduced by restricting use to those allowed by contractual arrangement with an organized club which provides insurance and requires its members to sign a waiver.

n trails which cross private property will be rare, but in such cases a contractual agreement which sets out the rights and duties of the parties is advisable.

n do not charge a fee for trail use, as this increases the duty of care in British Columbia

Insurance Costs

Insurance for most local government in British Columbia is provided by the Municipal Insurance Association.

Insurance premiums are based on a per capita formula, and as such the presence or absence of greenways and trails will not have an impact on the insurance rate structures to individual municipalities.

Municipalities may receive a 30% premium discount for no claims, and up to a 30% surcharge for a poor claims history.

The Municipal Insurance Association will advise their members on issues of specific liability once they embark on a greenway program.



Marking potential hazards to identify potential risks recognizes a 'duty of care' and helps to limit liability.

Greenway Management

Enjoyment

Creating facilities and programs to encourage use and enjoyment.

Managing the recreational resource created by the development of a greenway can expand the benefits of the greenway into a very wide cross section of the community. Facilities and programs must be developed to enhance and explain the environmental objectives of a greenway.

Maximizing User Benefits

Greenways can heighten community awareness, raise fitness, improve community spirit, and provide a focus for community group efforts.

Greenway programming can be a focus for a Greenway Alliance, and can keep a greenway alive and in the forefront of public awareness. However, the end users of a greenway may be a very different, and a much broader group, than those that initiated the greenway program.

Community involvement in using a greenway can include:

Environmental interest groups in environmental restoration and maintenance, e.g.

n Naturalists clubs doing bird counts, habitat restoration.

n Fish and wildlife clubs doing fish enhancement, etc.

Service clubs providing funds and volunteer labour for trail, fencing, signage and replanting projects, e.g.

n Rotary, Kinsmen, Lions, etc.

Life skill organizations using the greenway for training, e.g.

n Boy Scouts and Cubs

n Girl Guides

n John Howard Society, etc.

Education institutions using the greenway e.g.

n Elementary schools, for outdoor education.

n Secondary schools, for field practice related to science, biology, geography and ecology.

n Post-secondary institutions, for field practice in environmental assessment, design, and recreation management.

Community preventative health programs using the greenway for health protection, e.g.

n Walking events sponsored by the Heart and Stroke Foundation.

n Jogging clubs

n Cycling tours

n Gardening plots, and related shows and competitions

n Sports events such as triathalons.



Special events may include walks with environmental specialists such as biologists, ecologists, or foresters to share information about natural systems.

Programming and Special Events

Programming is an important aspect of greenway management. It provides opportunities for many people to benefit from a greenway individually or as part of a group. Special events advertised throughout the community maintain a public awareness of the greenway resource and help to retain the broad public support for greenways.

Ideas for special events to raise awareness of the Greenway include:

n Night time activities - 'owl prowl' or 'bat hike'

n Hike week or Celebrity walk

n Trail awards ceremonies

n Natural heritage days

n Theme speaker walks providing information on: geology, birds, wildlife, vegetation, history, fish, water quality

n Fitness runs or walks

n Fishing derby

n Equestrian ride & prizes

n Fun runs (for groups like politicians, corporations, etc.)

n Art in the park

n Creek cleanup days

n Agriculture Events

Interpretive programs

Greenways provide an ideal location for a wide variety of interpretive programs on such items as:

Biodiversity

- n Plant and salamander habitats.
- n Fish and fisheries sensitive zones.
- n Eagle nesting, eagle food and habitat needs.
- n Heron rookeries, heron food and habitat needs.
- n Woodpecker haunts and snag trees.
- n Waterfowl species and migration.
- n Walks through history.

Natural Systems

- n Marsh vegetation as a sewage treatment system.
- n Groundwater recharge and water quality.
- n Vegetation and air quality.
- n Plants as the lungs of planet earth.
- n Life in the mud (benthic fauna).

Urban Systems in a Natural Context

- n Constructed wetlands.
- n Groundwater ways.
- n Paving and flooding.
- n Urban wildlife and urban ecosystems.
- n Windthrow variables.
- n Impacts of invasive exotic plants.
- n Naturescape - backyard wildlife landscape.
- n New forestry.

Interpretive Media

Interpretive programs can be communicated by a variety of media, including:

Outdoor sign programs

Use simple, silhouette vinyl graphics to reduce production costs. Full colour photographs can be reproduced on signs, but at high cost.

Devise a coordinated signage system which integrates interpretive, information, and regulatory signage.

Be careful to design for the main hazards to outdoor signage - vandalism, theft, and the weather, including fading due to ultraviolet exposure.

Consider triggering economies of scale by sharing sign production costs with interpretive programs in other jurisdictions in similar natural environments.

Printed Handouts

Brochures can carry a similar message to signage programs, without the vandalism and weather problems associated with signs.

Trail maps can include interpretive information.

Locations for distributing the brochures, and recycling or litter collection facilities, will be required.

Multi-media kiosks

A new alternative for interactive information display is available through multi-media. CD Rom technology is used to store words, pictures and video clips which can be accessed by computer. The power of multimedia is in the ability of the user to sort the information to get information focused to their specific interest.

Multi-media kiosks need reliable power sources, weather and vandalism protection, and reasonable light conditions.

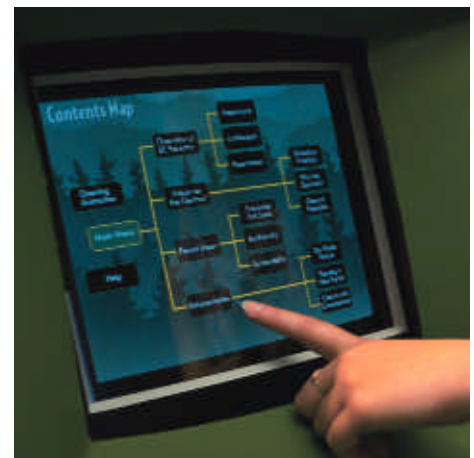
Interpretive Tours

Direct contact by interpretive leaders is one of the most flexible and successful components of any interpretive program. To find leaders:

- n Approach your local professional associations.
- n Solicit the talents of local or senior government staff.
- n Ask for volunteers from environmental organizations.
- n Approach school and college staff and students.



Signs are useful to convey basic information to a broad audience. Signs can be inexpensive to produce but should consider the effects of weather and vandalism in their design.



This Ministry of Forests interpretive kiosk provides a great deal of information and allows users to sort quickly to get access to the information they need.



For More Information

The Stewardship Series

The Stewardship Series is a group of publications describing stewardship activities for various audiences. The series is funded by federal and provincial governments in partnership with non-government organizations on a project by project basis. Current publications include:

Stream Stewardship: A Guide for Planners and Developers

This document introduces concepts and relationships between urban development and the fisheries resource.

Department of Fisheries and Oceans, and Province of B.C., 1994.

Phone (604) 666-3545

Stewardship 94

Proceedings from a conference held March 3-5, 1994 on revisiting the land ethic and caring for the land.

Nora Layard and Lorelee Delbrouck (Eds.), 1994. \$15.

Phone (604) 387-9369

Water Stewardship: A Guide for Teachers, Students and Community Groups

This guide was written by teachers for teachers and outlines ways to start educating students, friends and community groups about the importance of water.

Ministry of Environment, Lands and Parks, 1994. \$20.

Phone 1-800-387-9853

The Streamkeepers Handbook: a Practical Guide to Stream and Wetland Care

Provides guidance for people who wish to help protect and restore local waterways in British Columbia. Projects are organized in modules, permitting easy updating of information.

G. Taccogna and K. Munro (Eds.). Department of Fisheries and Oceans, 1995. \$30. Phone (604) 666-3545

Community Stewardship: A Guide to Establishing Your Own Group

A practical guide to assist individuals, groups and communities get organized to do stewardship work.

Fraser River Management Program, 1995.

Phone (604) 660-1177

Naturescape British Columbia: Caring for Wildlife Habitat at Home

The Naturescape kit provides the tools people need to restore, maintain, improve or protect wildlife habitat at home.

Ministry of Environment, Lands and Parks, 1995.

Phone 1-800-387-9853

Additional Stewardship Publications

Additions to the Stewardship Series are in progress.

Other Suggested Readings

Chilibeck, B. et al. *Land Development Guidelines for the Protection of Aquatic Habitat*. Department of Fisheries and Oceans / Ministry of Environment, Lands and Parks. British Columbia. 1992.

Commission on Resources and Environment. *Finding Common Ground: A Shared Vision for Land Use in British Columbia*. British Columbia. 1994.

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Furuset, O.J., Altman, R.E. *Greenway Use and Users: An Examination of Raleigh and Charlotte Greenways*. Carolina Planning, Vol. 16, No. 2, 1990.

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Hope, D., Yachuk, D. *Community Cycling Manual - A Planning and Design Guide*. Canadian Institute of Planners. Ottawa. 1990.

Little, Charles E. *Greenways for America*. The John Hopkins University Press, 1990.

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Quayle, Moura. City of Vancouver Urban Landscape Task Force. *Greenways-Public Ways*. Final Report, May 1992.

Rivers and Trails Conservation Assistance Program. *Economic Impacts of Protecting Rivers, Trails, and Greenway Corridors*. National Park Service. 1992.

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Schwarz, Loring LaB. (Ed.) *Greenways: A Guide to Planning, Design and Development*. The Conservation Fund. Island Press, Washington, D.C. 1993.

Smith, D.S., Hellmund, P.C. (Eds.). *Ecology of Greenways*. University of Minnesota Press. Minneapolis. 1993.

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Twolan-Strutt, L. *Wetlands and Woodlots*. North America Wetlands Conservation Council (Canada). Ottawa. 1995.

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Community Greenways promises to be an excellent and highly practical addition to the emerging literature on greenways. We are impressed with the comprehensive treatment, persuasive arguments, pertinent quotes and useful examples integrated into this handbook. It is well designed, with creative and helpful use of charts, maps and other illustrations.

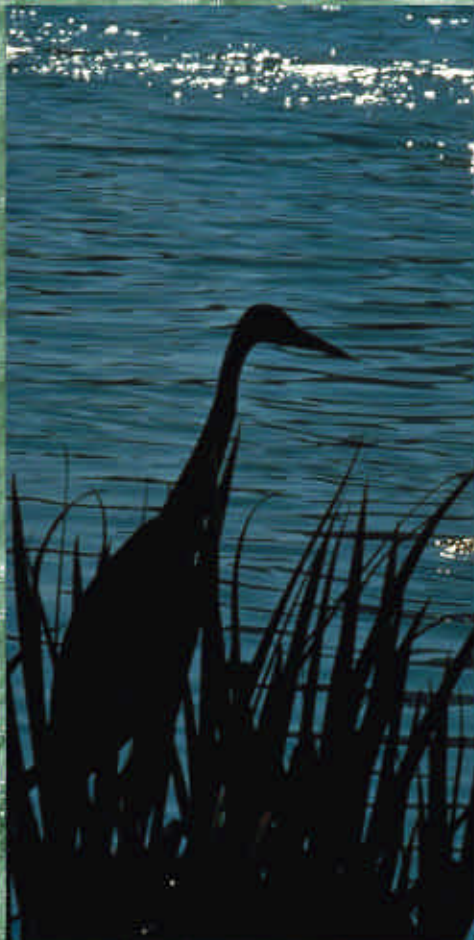
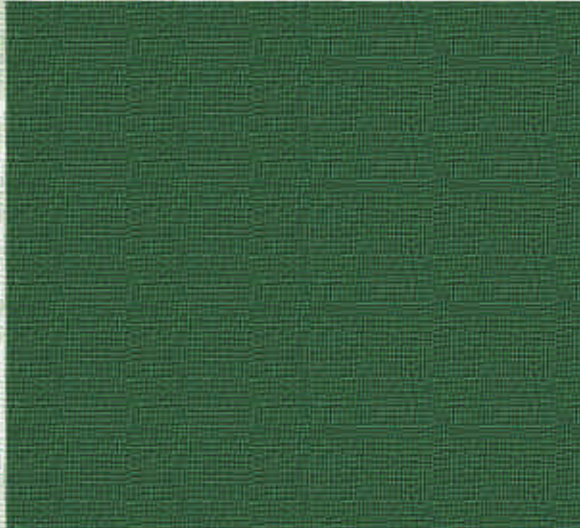
**The Honourable David Crombie, P.C.,
Commissioner, Waterfront Regeneration Trust**

Community Greenways serve many purposes: surely one of the most important will be to remind us of our growing alienation from a Nature on which we are totally dependent. The pressures of a technological world grow rapidly. Greenways are a release, where perhaps we can jog, listen to a bird's song or enjoy green leaves in the sunshine.

Dr. Bert Brink, OC, OBC

Community Greenways is a solid document in concept and content; it is a treasure of practical information. For those working in any occupation dealing with land use, the section *Cutting Red Tape With Greenways Programs* is rewarding reading.

Tim Pringle, Executive Director of the Real Estate Foundation of B.C.



Greenways are Places, ...and a Way of Thinking

As Places:

Greenways are networks of green space creating linkages for nature between public lands, like parks and trails, together with private working landscapes, like forests and farms.

As a Way of Thinking:

Greenways link ecosystems to local land use planning.

Greenways help maintain our watersheds to protect clean air, clean land, and clean water. These are the basic needs of plants, of wildlife, of fish, of agriculture, of forest production, of us.